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Tani et al.

(10) **Patent No.: US 9,420,129 B2**
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(54) **OPERATION CONSOLE, CONTROL METHOD THEREOF AND IMAGE FORMING APPARATUS**

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(73) Assignee: **Sharp Kabushiki Kaisha**, Osaka (JP)

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(22) Filed: **May 19, 2015**

(65) **Prior Publication Data**

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Related U.S. Application Data

(63) Continuation of application No. 14/227,824, filed on Mar. 27, 2014, now Pat. No. 9,069,496, which is a continuation of application No. 13/237,096, filed on Sep. 20, 2011, now Pat. No. 8,724,127.

(30) **Foreign Application Priority Data**

Sep. 28, 2010 (JP) 2010-216862

(51) **Int. Cl.**
G06F 15/00 (2006.01)
H04N 1/00 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***H04N 1/00442*** (2013.01); ***G03G 15/502*** (2013.01); ***G03G 15/5087*** (2013.01); ***G06F 3/1204*** (2013.01); ***G06F 3/1253*** (2013.01); ***H04N 1/0049*** (2013.01); ***H04N 1/00392*** (2013.01); ***H04N 1/00411*** (2013.01); ***H04N 1/00424*** (2013.01); ***H04N 1/00456*** (2013.01); ***H04N 1/00474*** (2013.01); ***H04N 1/00477*** (2013.01); ***H04N 1/00482*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC H04N 1/00392; H04N 1/00411; H04N 2201/0094
USPC 358/1.15
See application file for complete search history.

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8,724,127 B2 * 5/2014 Tani et al. 358/1.13

OTHER PUBLICATIONS

Tani et al., "Operation Console, Control Method Thereof and Image Forming Apparatus", U.S. Appl. No. 14/227,824, filed Mar. 2014.

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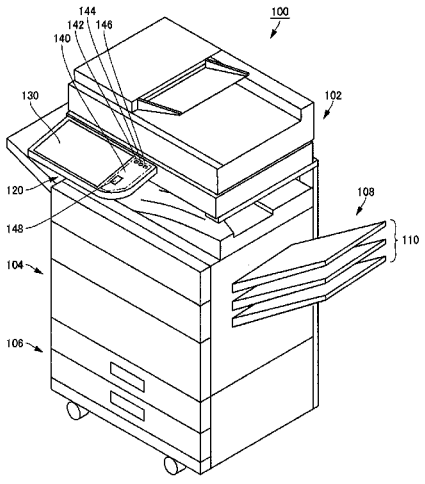
(57) **ABSTRACT**

In an operation unit, a display panel displays a two-sided copy setting screen image including a still image display area on which a plurality of software keys (two-sided copy setting keys) corresponding to respective ones of a plurality of processes (one-sided/one-sided copy process, one-sided/two-sided copy process, two-sided/two-sided copy process and two-sided/one-sided copy process), for selecting any of the plurality of processes, are displayed. A touch-panel receives an input operation to the plurality of software keys. In response to the touch-panel receiving the input operation, a CPU displays, on a movie display area different from the still image display area of the two-sided copy setting screen image, an image representing contents of the selected process in a prescribed state.

15 Claims, 16 Drawing Sheets



(51) **Int. Cl.**
G03G 15/00 (2006.01)
G06F 3/12 (2006.01)

(52) **U.S. Cl.**
CPC *G03G2215/00109* (2013.01); *H04N 2201/0094* (2013.01)

FIG.1

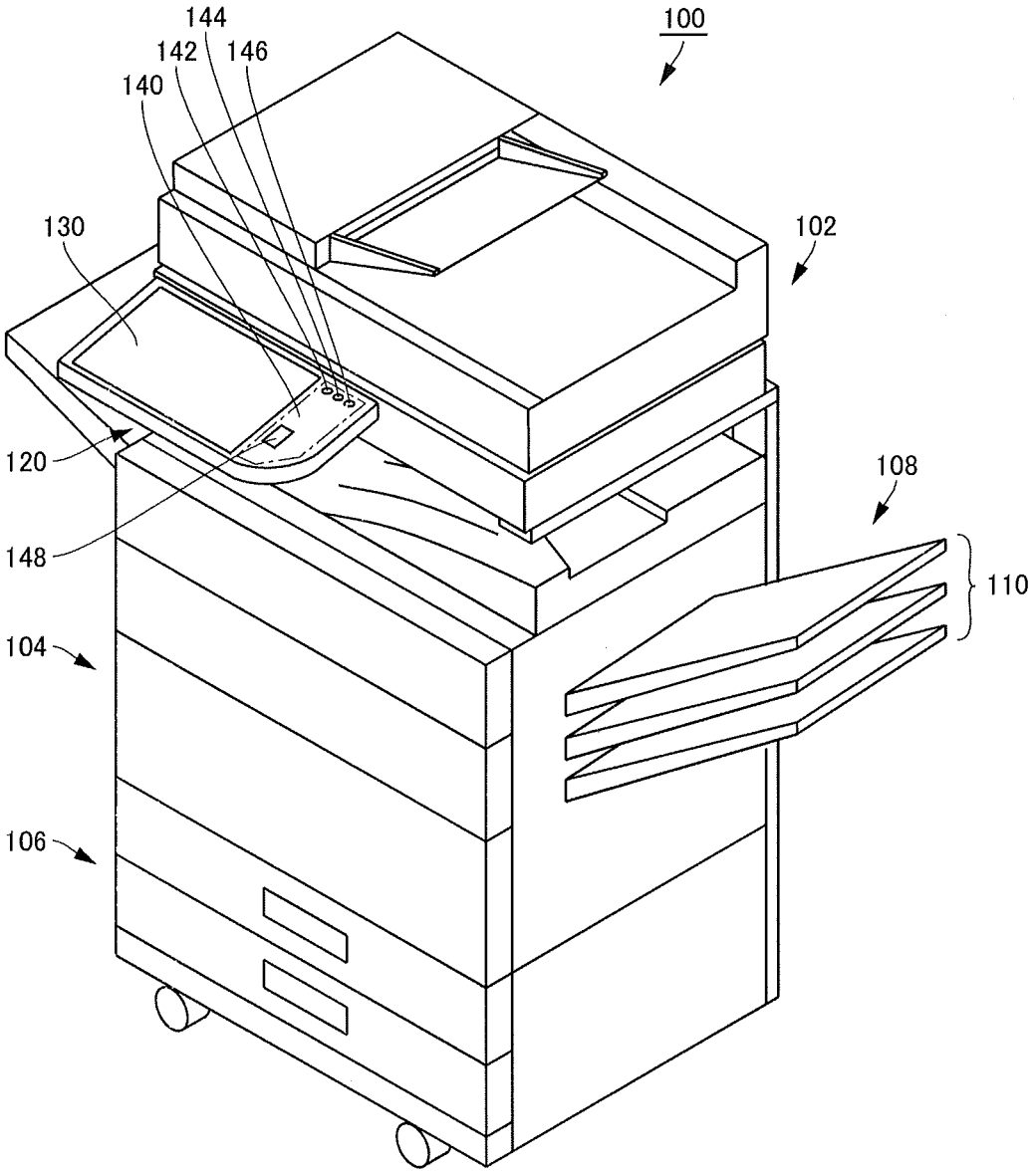


FIG.2

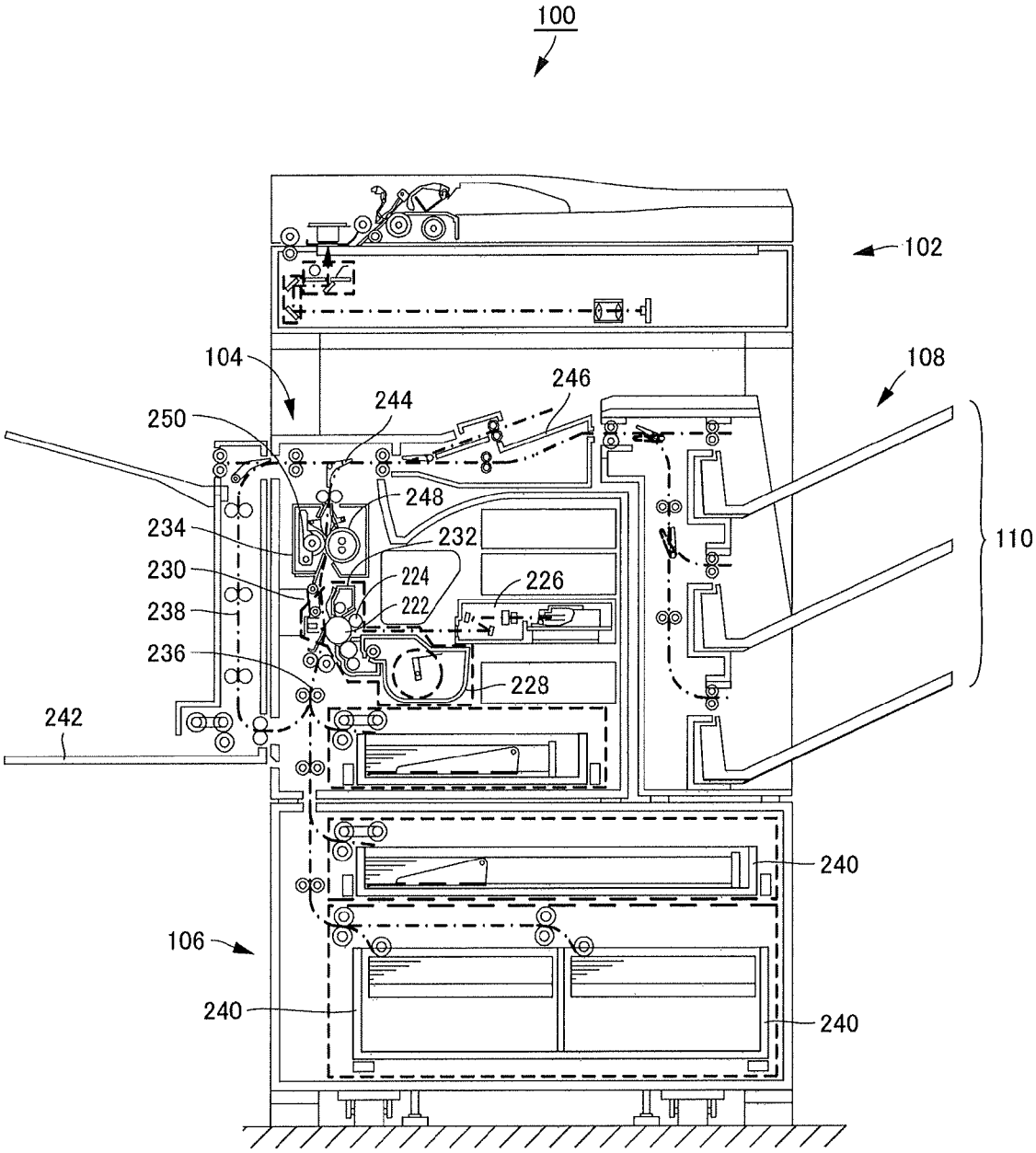

100
102
104
108
110
106
242
250
244
246
248
234
232
230
224
226
238
222
236
228
240
240
240

FIG.3

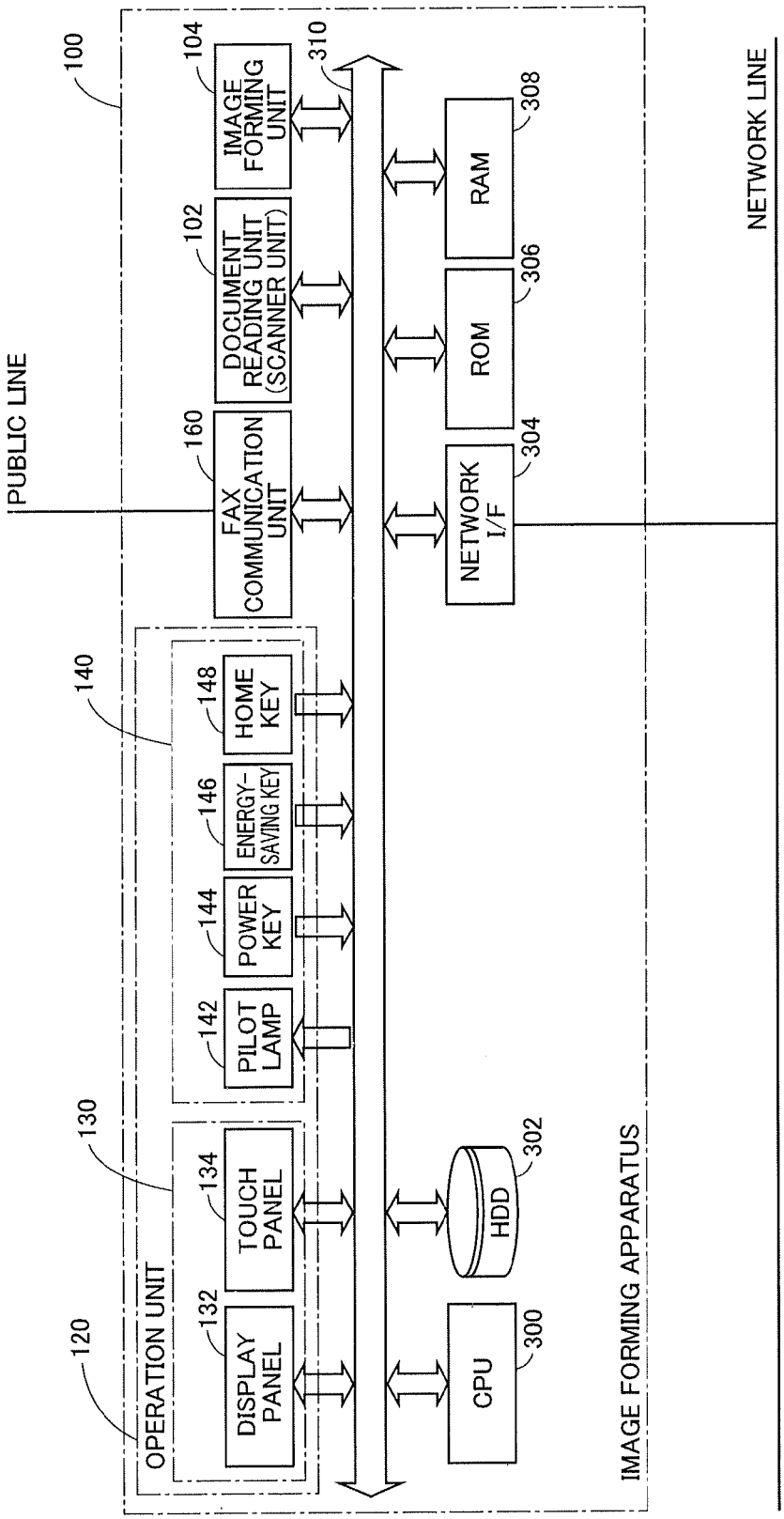

100
104
IMAGE FORMING UNIT
310
102
DOCUMENT READING UNIT (SCANNER UNIT)
160
FAX COMMUNICATION UNIT
PUBLIC LINE
308
RAM
306
ROM
304
NETWORK I/F
NETWORK LINE
140
148
HOME KEY
146
ENERGY-SAVING KEY
144
POWER KEY
142
PILOT LAMP
130
134
TOUCH PANEL
132
DISPLAY PANEL
OPERATION UNIT
120
302
HDD
300
CPU
IMAGE FORMING APPARATUS

FIG.4

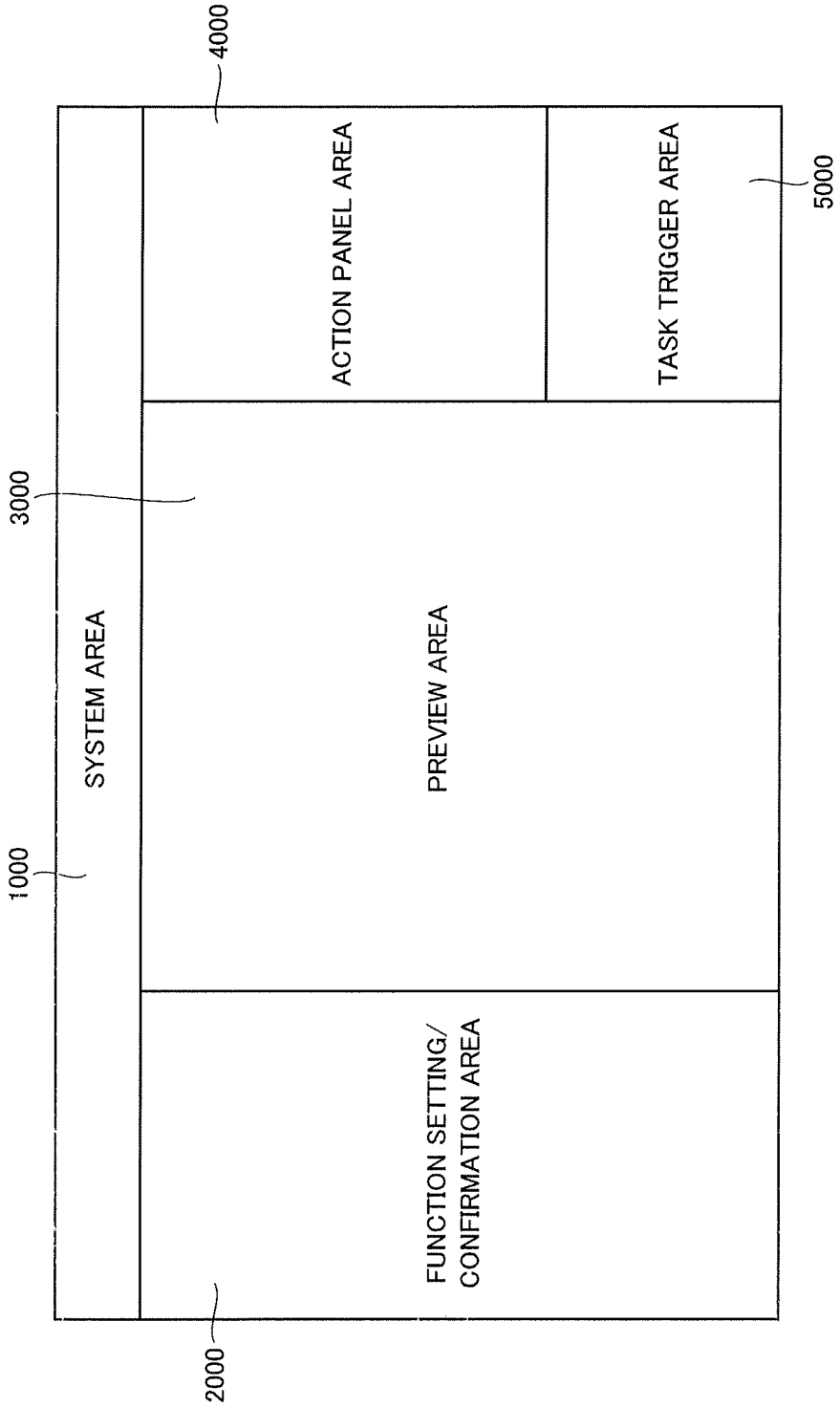

4000
ACTION PANEL AREA
TASK TRIGGER AREA
5000
3000
SYSTEM AREA
PREVIEW AREA
1000
FUNCTION SETTING/
CONFIRMATION AREA
2000

FIG.5

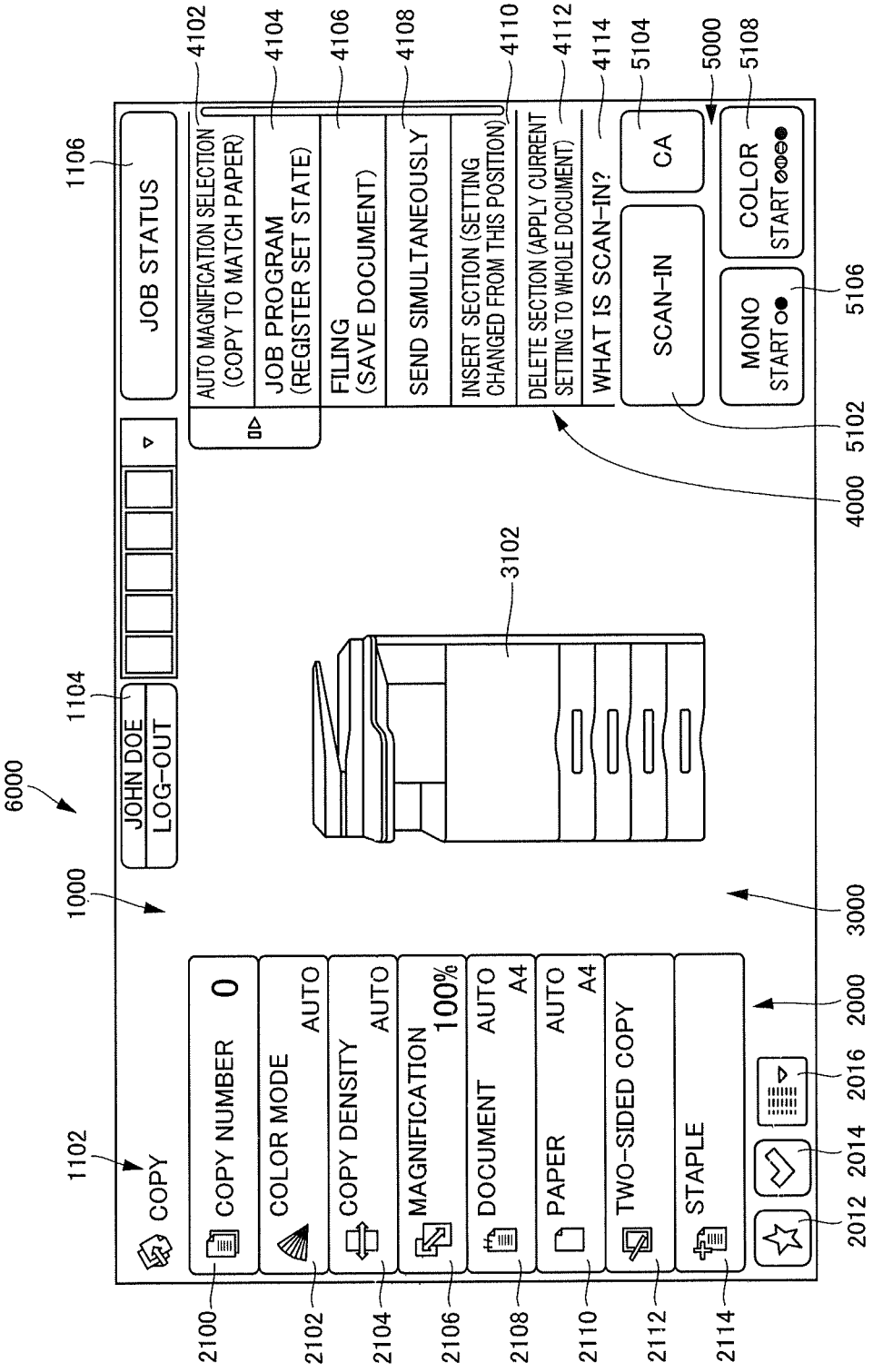

6000
1000
1102
1104
1106
JOHN DOE
LOG-OUT
JOB STATUS
COPY
COPY NUMBER 0
COLOR MODE AUTO
COPY DENSITY AUTO
MAGNIFICATION 100%
DOCUMENT AUTO A4
PAPER AUTO A4
TWO-SIDED COPY
STAPLE
2100
2102
2104
2106
2108
2110
2112
2114
2012
2014
2016
2000
3000
3102
4000
4102
AUTO MAGNIFICATION SELECTION (COPY TO MATCH PAPER)
4104
JOB PROGRAM (REGISTER SET STATE)
4106
FILING (SAVE DOCUMENT)
4108
SEND SIMULTANEOUSLY
4110
INSERT SECTION (SETTING CHANGED FROM THIS POSITION)
4112
DELETE SECTION (APPLY CURRENT SETTING TO WHOLE DOCUMENT)
4114
WHAT IS SCAN-IN?
5000
5102
SCAN-IN
CA
5104
MONO START
COLOR START
5106
5108

FIG.6

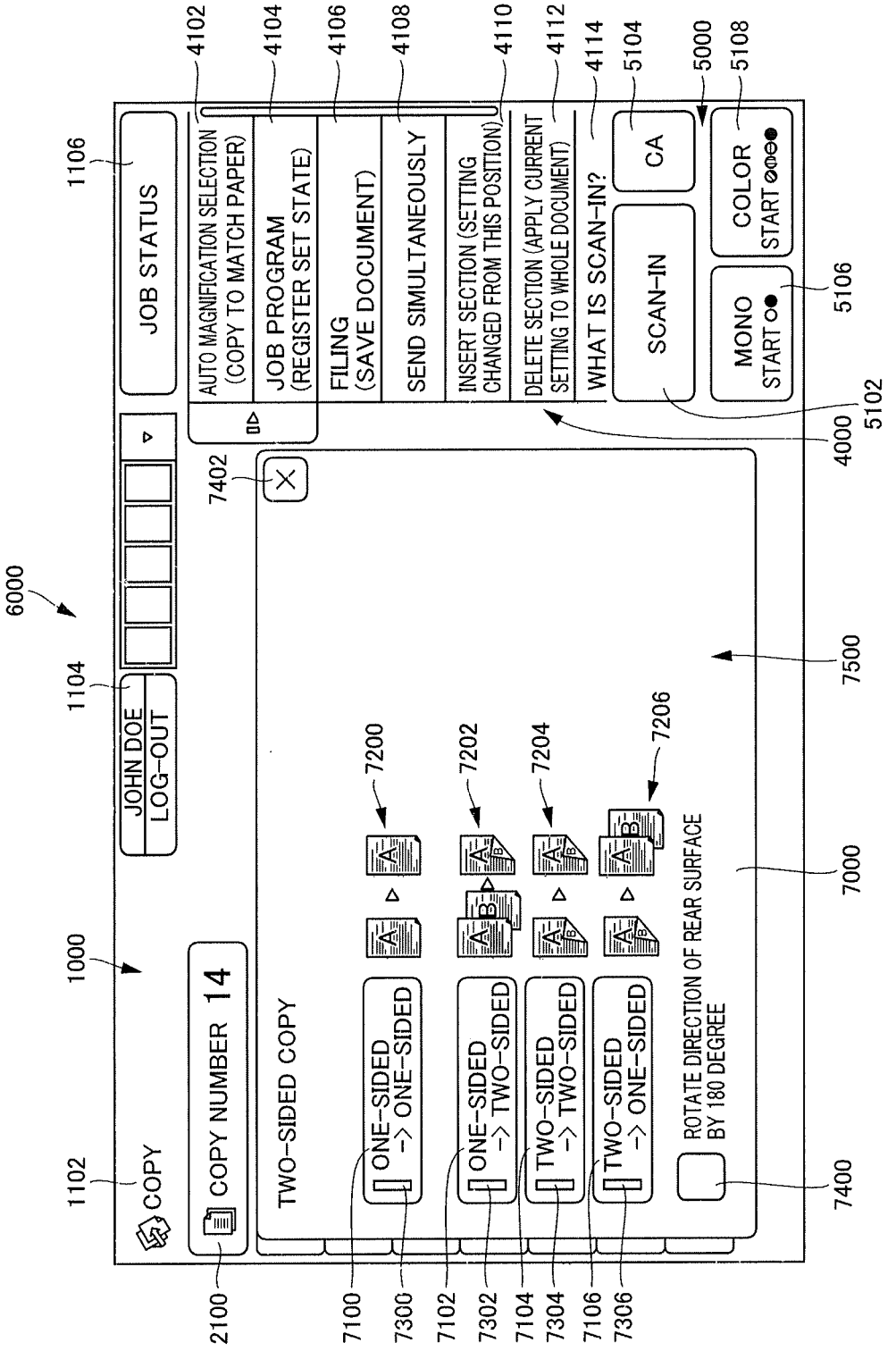

6000
1000
1102
COPY
1104
JOHN DOE
LOG-OUT
1106
JOB STATUS
4102
AUTO MAGNIFICATION SELECTION (COPY TO MATCH PAPER)
4104
JOB PROGRAM (REGISTER SET STATE)
4106
FILING (SAVE DOCUMENT)
4108
SEND SIMULTANEOUSLY
4110
INSERT SECTION (SETTING CHANGED FROM THIS POSITION)
4112
DELETE SECTION (APPLY CURRENT SETTING TO WHOLE DOCUMENT)
4114
WHAT IS SCAN-IN?
5104
CA
5000
5108
COLOR START
SCAN-IN
MONO START
5106
5102
4000
7402
7500
7000
7400
COPY NUMBER 14
TWO-SIDED COPY
ONE-SIDED -> ONE-SIDED
ONE-SIDED -> TWO-SIDED
TWO-SIDED -> TWO-SIDED
TWO-SIDED -> ONE-SIDED
ROTATE DIRECTION OF REAR SURFACE BY 180 DEGREE
7200
7202
7204
7206
2100
7100
7300
7102
7302
7104
7304
7106
7306

FIG.7

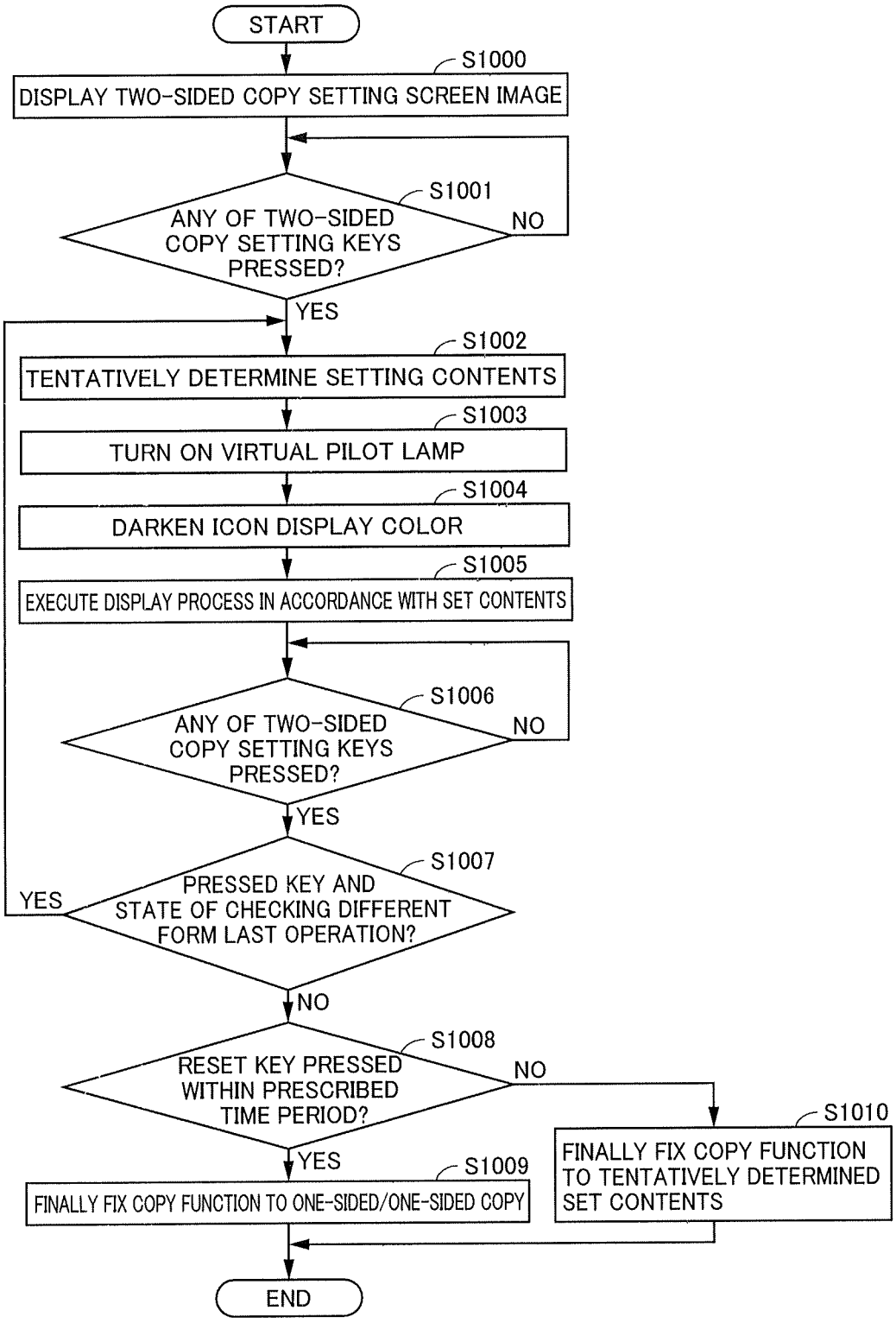

START
S1000
DISPLAY TWO-SIDED COPY SETTING SCREEN IMAGE
S1001
ANY OF TWO-SIDED COPY SETTING KEYS PRESSED?
NO
YES
S1002
TENTATIVELY DETERMINE SETTING CONTENTS
S1003
TURN ON VIRTUAL PILOT LAMP
S1004
DARKEN ICON DISPLAY COLOR
S1005
EXECUTE DISPLAY PROCESS IN ACCORDANCE WITH SET CONTENTS
S1006
ANY OF TWO-SIDED COPY SETTING KEYS PRESSED?
NO
YES
S1007
PRESSED KEY AND STATE OF CHECKING DIFFERENT FORM LAST OPERATION?
YES
NO
S1008
RESET KEY PRESSED WITHIN PRESCRIBED TIME PERIOD?
NO
YES
S1009
FINALLY FIX COPY FUNCTION TO ONE-SIDED/ONE-SIDED COPY
S1010
FINALLY FIX COPY FUNCTION TO TENTATIVELY DETERMINED SET CONTENTS
END

FIG.8

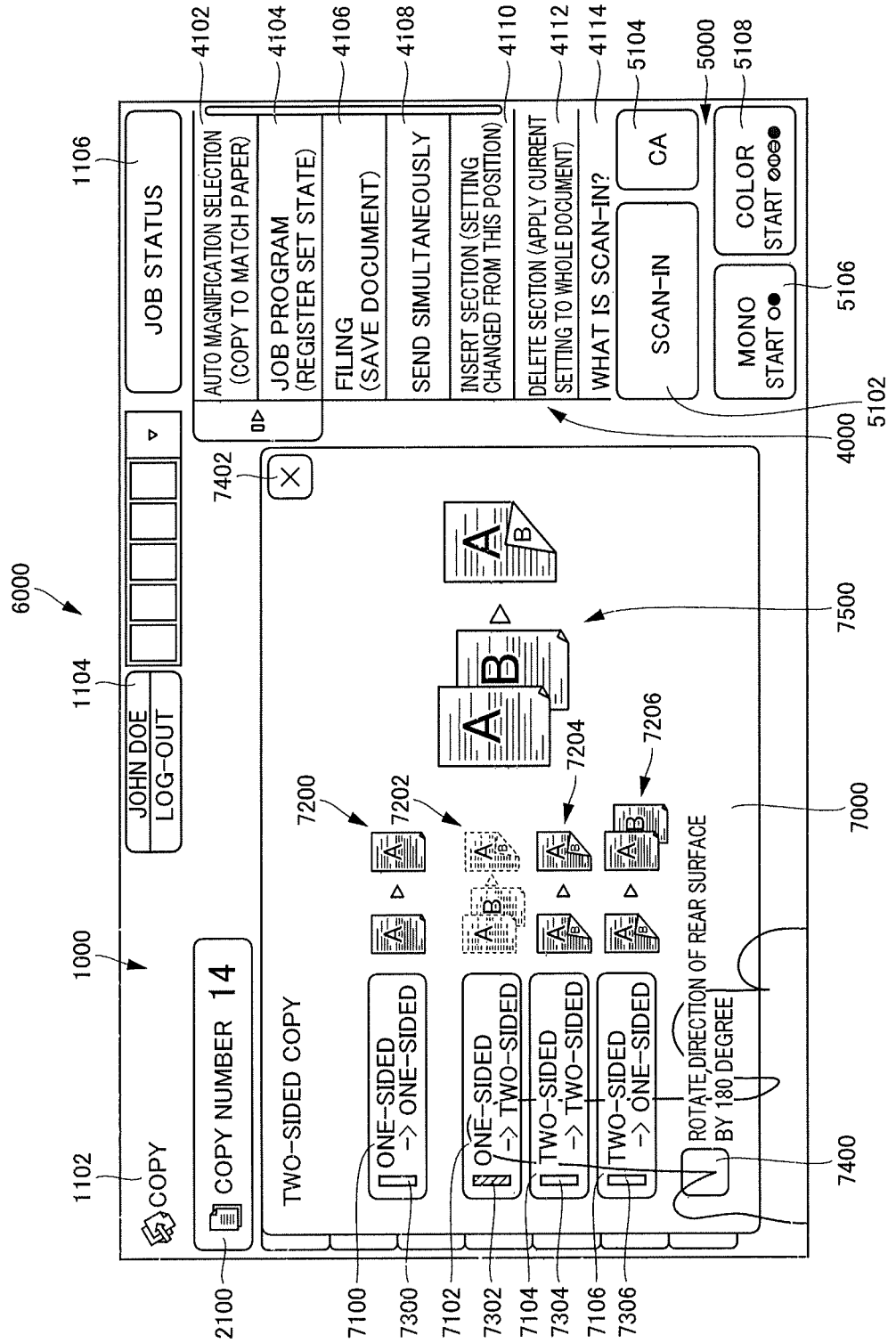

6000
1104
JOHN DOE
LOG-OUT
1106
JOB STATUS
4102
AUTO MAGNIFICATION SELECTION (COPY TO MATCH PAPER)
4104
JOB PROGRAM (REGISTER SET STATE)
4106
FILING (SAVE DOCUMENT)
4108
SEND SIMULTANEOUSLY
4110
INSERT SECTION (SETTING CHANGED FROM THIS POSITION)
4112
DELETE SECTION (APPLY CURRENT SETTING TO WHOLE DOCUMENT)
4114
WHAT IS SCAN-IN?
5104
CA
5000
5108
COLOR START
SCAN-IN
MONO START
5106
5102
4000
7402
7500
1000
1102
COPY
COPY NUMBER 14
TWO-SIDED COPY
7200
7202
7204
7206
7000
ONE-SIDED -> ONE-SIDED
ONE-SIDED -> TWO-SIDED
TWO-SIDED -> TWO-SIDED
TWO-SIDED -> ONE-SIDED
ROTATE DIRECTION OF REAR SURFACE BY 180 DEGREE
7400
2100
7100
7300
7102
7302
7104
7304
7106
7306

FIG.9

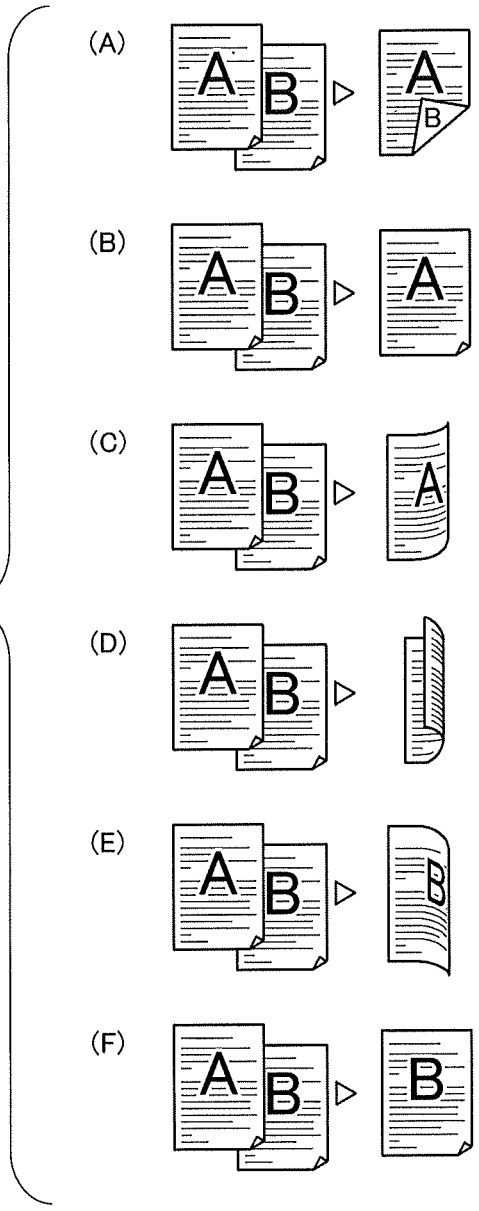


FIG.10

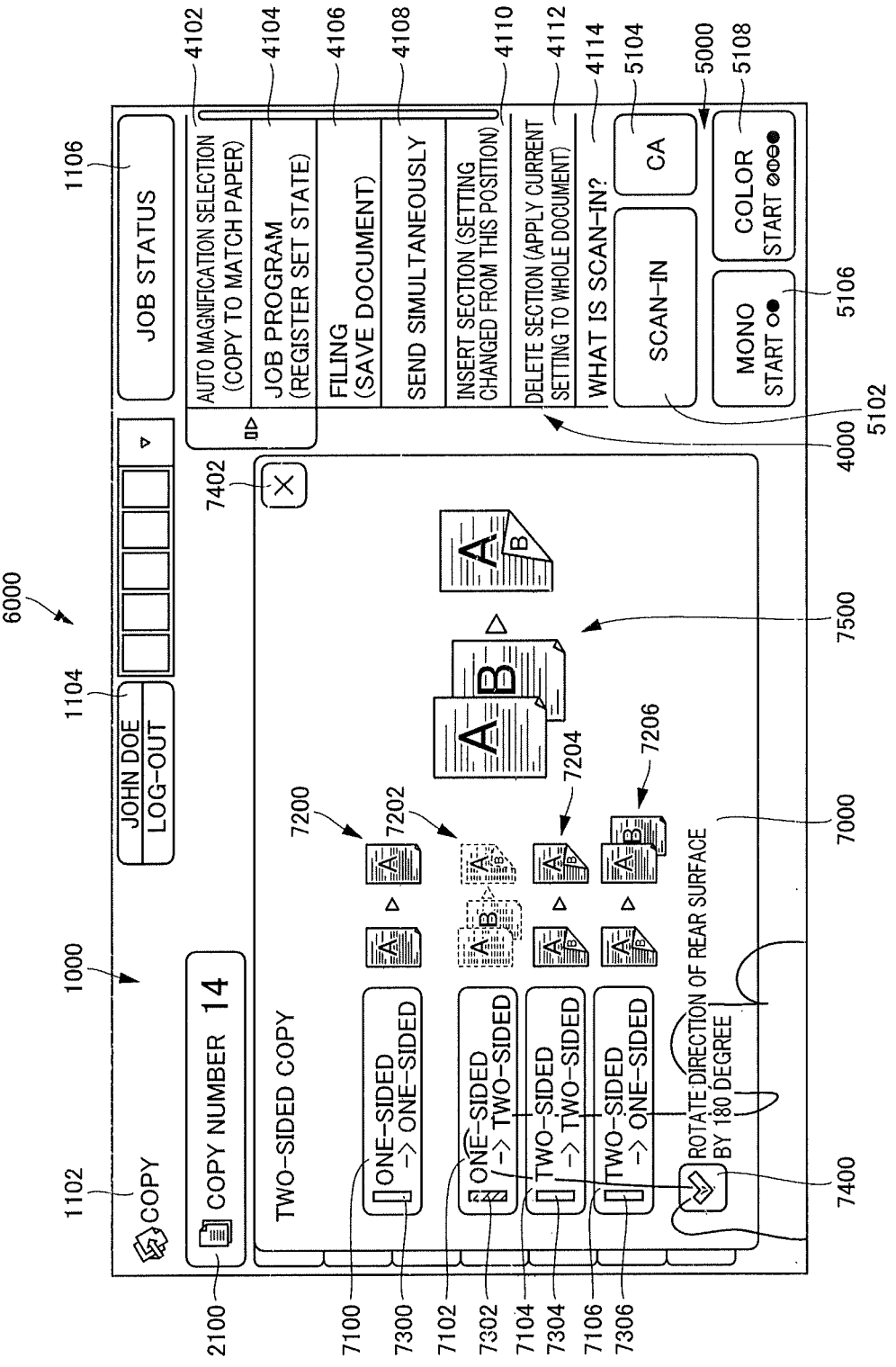

6000
1104
JOHN DOE
LOG-OUT
1106
JOB STATUS
4102
AUTO MAGNIFICATION SELECTION (COPY TO MATCH PAPER)
4104
JOB PROGRAM (REGISTER SET STATE)
4106
FILING (SAVE DOCUMENT)
4108
SEND SIMULTANEOUSLY
4110
INSERT SECTION (SETTING CHANGED FROM THIS POSITION)
4112
DELETE SECTION (APPLY CURRENT SETTING TO WHOLE DOCUMENT)
4114
WHAT IS SCAN-IN?
5104
SCAN-IN
CA
5000
5108
COLOR START
MONO START
5106
5102
4000
7402
7500
7200
7202
7204
7206
7000
1000
1102
COPY
COPY NUMBER 14
TWO-SIDED COPY
ONE-SIDED -> ONE-SIDED
ONE-SIDED -> TWO-SIDED
TWO-SIDED -> TWO-SIDED
TWO-SIDED -> ONE-SIDED
ROTATE DIRECTION OF REAR SURFACE BY 180 DEGREE
7400
2100
7100
7300
7102
7302
7104
7304
7106
7306

FIG.11

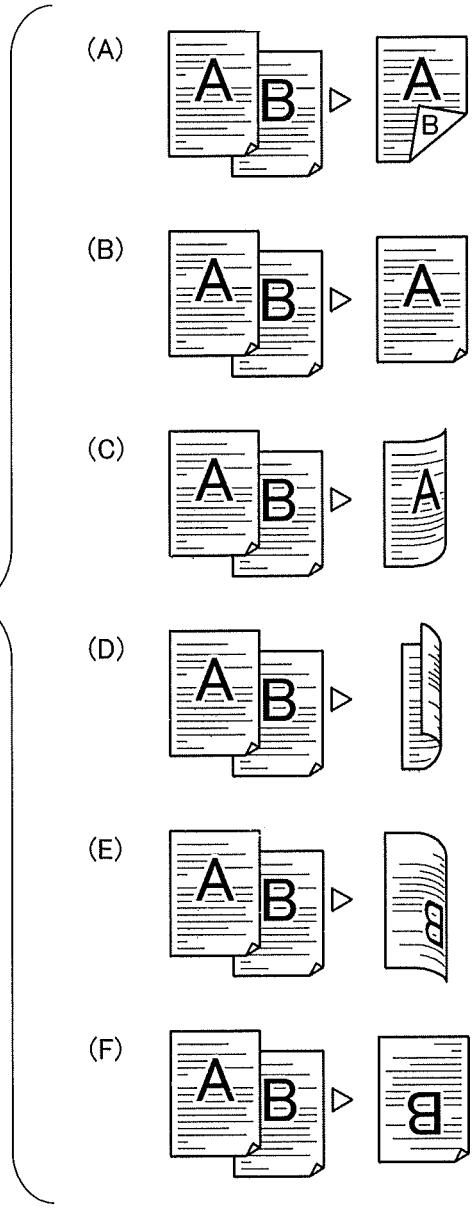


FIG.12

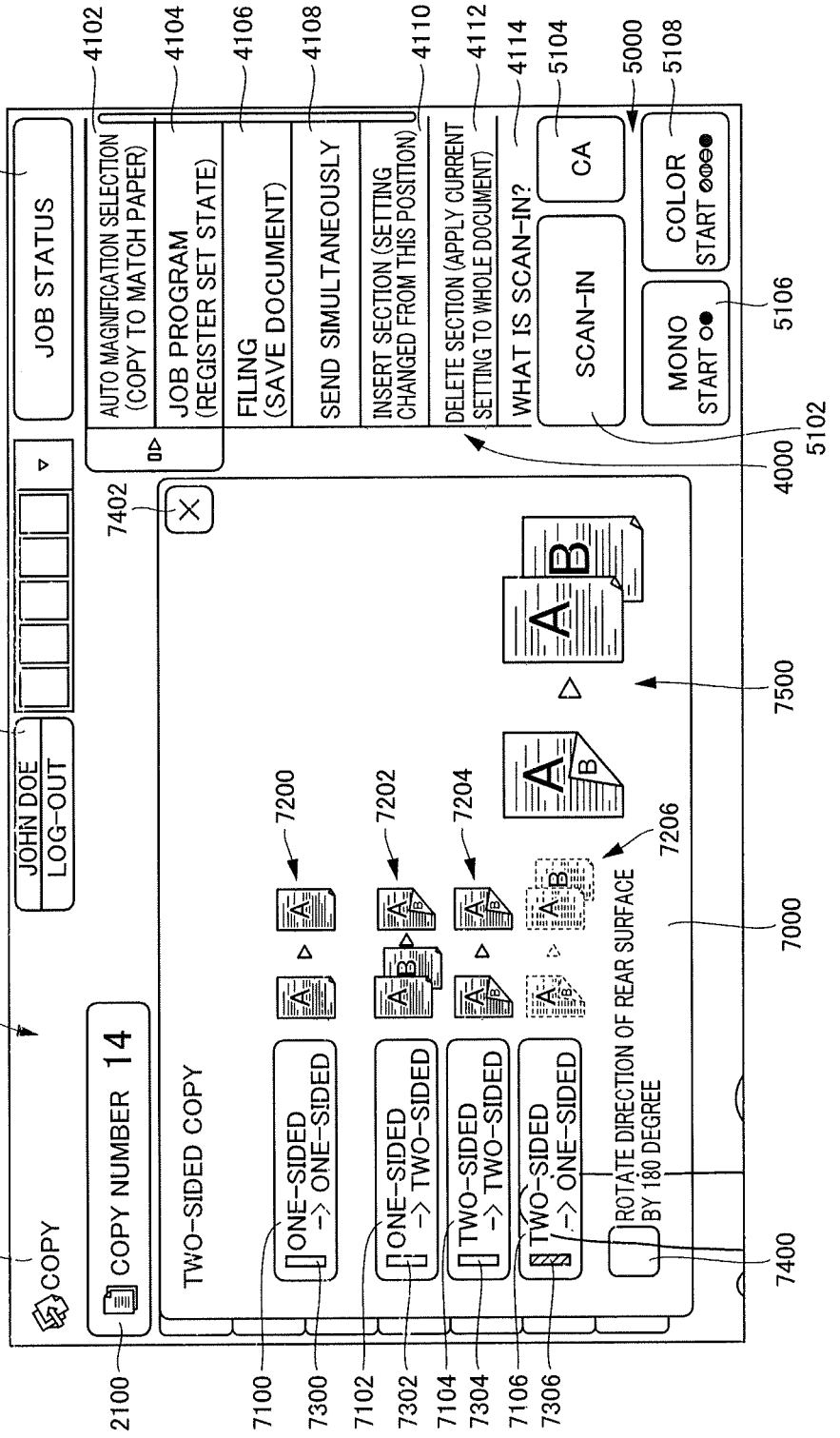

6000
1000
1102
COPY
1104
JOHN DOE
LOG-OUT
1106
JOB STATUS
4102
AUTO MAGNIFICATION SELECTION (COPY TO MATCH PAPER)
4104
JOB PROGRAM (REGISTER SET STATE)
4106
FILING (SAVE DOCUMENT)
4108
SEND SIMULTANEOUSLY
4110
INSERT SECTION (SETTING CHANGED FROM THIS POSITION)
4112
DELETE SECTION (APPLY CURRENT SETTING TO WHOLE DOCUMENT)
4114
WHAT IS SCAN-IN?
5104
CA
5000
5108
COLOR START
5106
MONO START
SCAN-IN
4000
5102
7402
7500
7200
7202
7204
7206
7000
COPY NUMBER 14
TWO-SIDED COPY
ONE-SIDED -> ONE-SIDED
ONE-SIDED -> TWO-SIDED
TWO-SIDED -> TWO-SIDED
TWO-SIDED -> ONE-SIDED
ROTATE DIRECTION OF REAR SURFACE BY 180 DEGREE
7400
2100
7100
7300
7102
7302
7104
7304
7106
7306

FIG.13

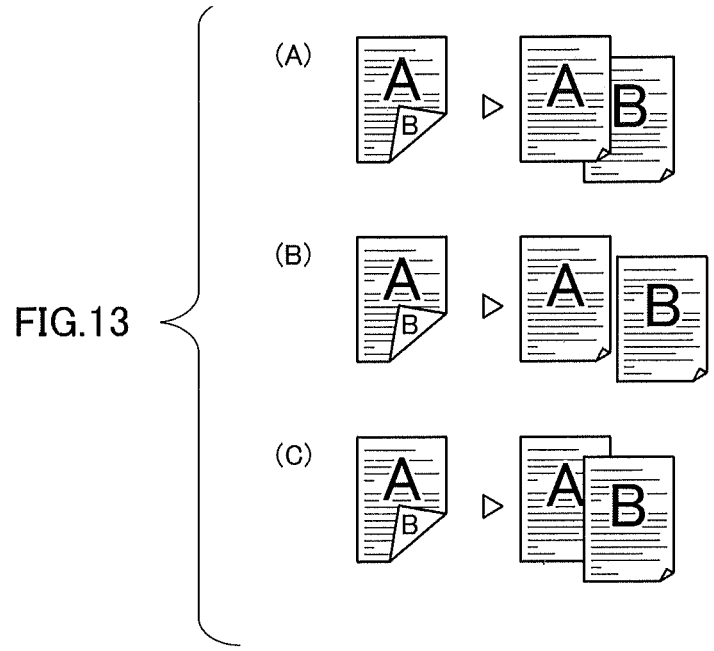
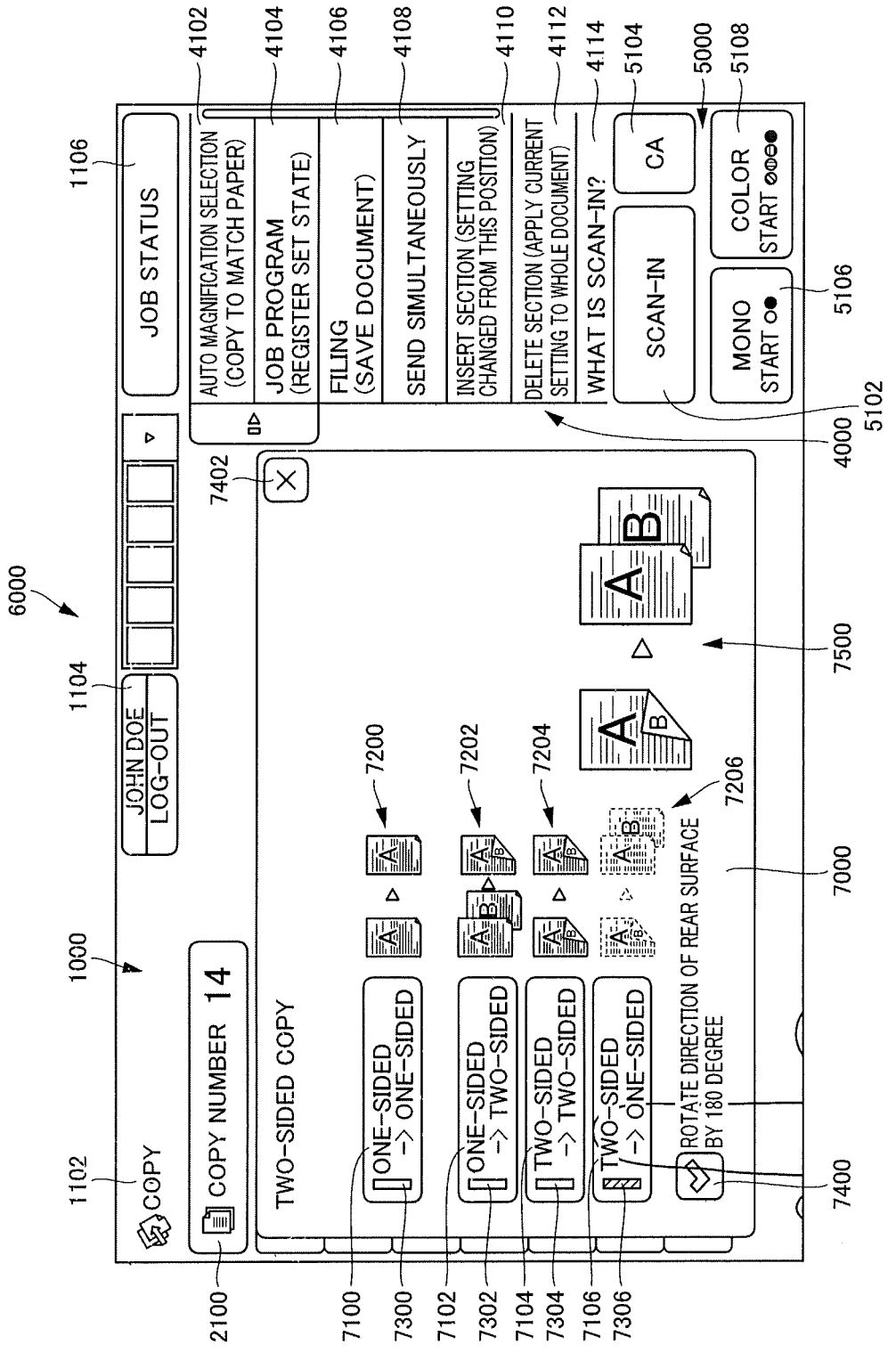


FIG.14


6000
1000
1102
COPY
COPY NUMBER 14
TWO-SIDED COPY
ONE-SIDED -> ONE-SIDED
ONE-SIDED -> TWO-SIDED
TWO-SIDED -> TWO-SIDED
TWO-SIDED -> ONE-SIDED
ROTATE DIRECTION OF REAR SURFACE BY 180 DEGREE
1104
JOHN DOE
LOG-OUT
1106
JOB STATUS
7402
AUTO MAGNIFICATION SELECTION (COPY TO MATCH PAPER)
JOB PROGRAM (REGISTER SET STATE)
FILING (SAVE DOCUMENT)
SEND SIMULTANEOUSLY
INSERT SECTION (SETTING CHANGED FROM THIS POSITION)
DELETE SECTION (APPLY CURRENT SETTING TO WHOLE DOCUMENT)
WHAT IS SCAN-IN?
SCAN-IN
CA
MONO START
COLOR START
4102
4104
4106
4108
4110
4112
4114
5104
5000
5108
5106
5102
4000
7500
7000
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7304
7106
7306

FIG.15

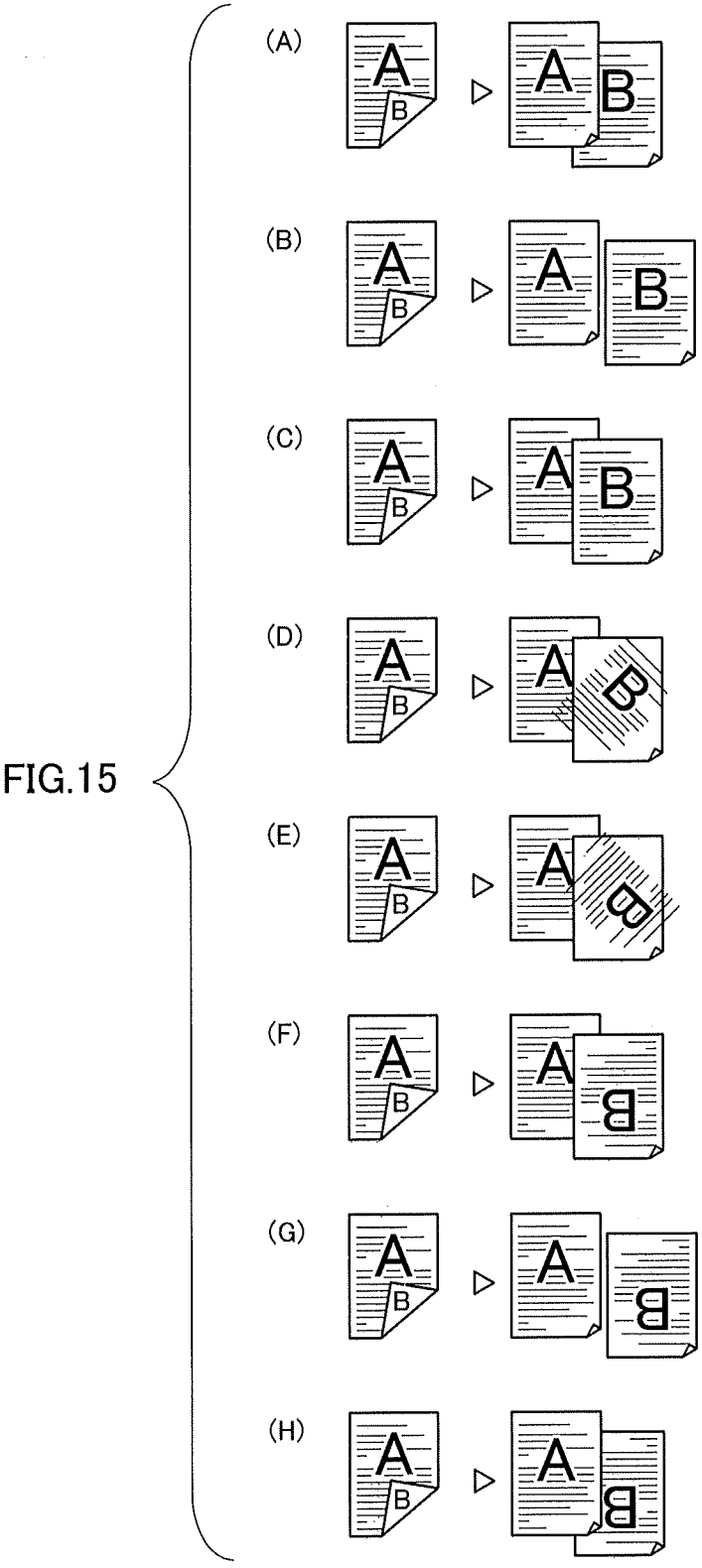
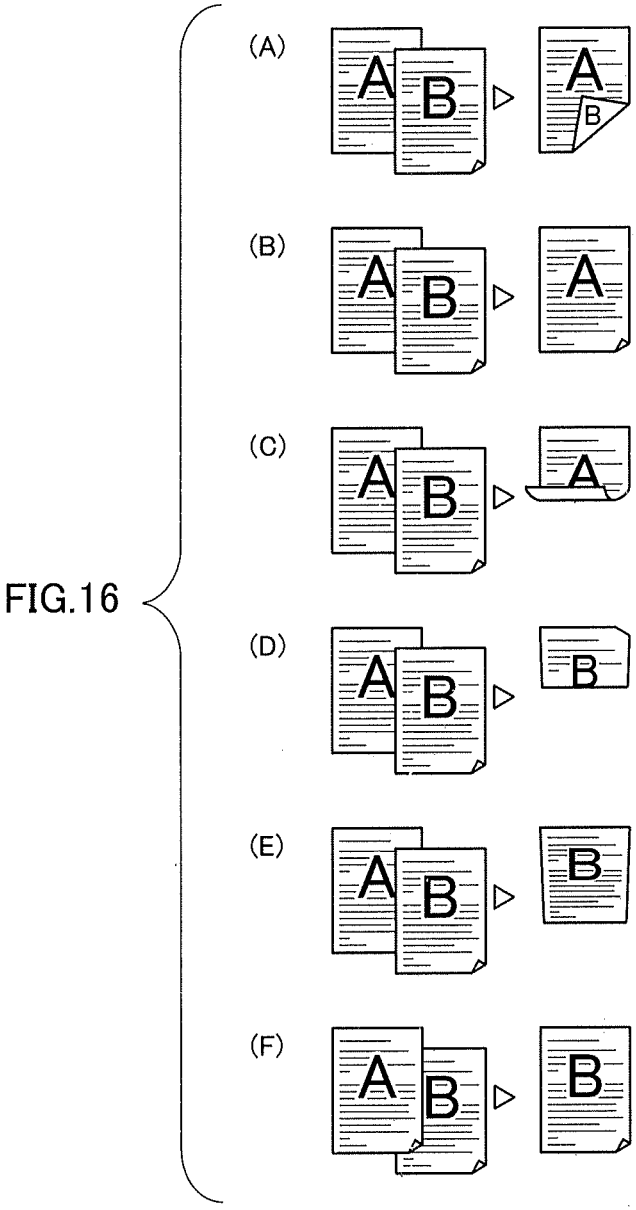


FIG.16



OPERATION CONSOLE, CONTROL METHOD THEREOF AND IMAGE FORMING APPARATUS

CROSS-REFERENCE TO RELATED APPLICATION

This nonprovisional application claims priority under 35 U.S.C. §119(a) on Patent Application No. 2010-216862 filed in Japan on Sep. 28, 2010, the entire contents of which are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an operation console and an image forming apparatus and, more specifically, to a technique of displaying an image representing contents of a process.

2. Description of the Background Art

Conventionally, image forming apparatuses capable of executing two-sided copy in addition to one-sided copy from one-sided document (hereinafter referred to as one-sided/one-sided copy) have been known. The two-sided copy includes two-sided copy from one-sided document (hereinafter referred to as one-sided/two-sided copy), two-sided copy from two-sided document (hereinafter referred to as two-sided/two-sided copy), and one-sided copy from two-sided document (hereinafter referred to as two-sided/one-sided copy). In such an image forming apparatus, a technique of indicating by icons the contents of the aforementioned two-sided copy processes has been known.

By way of example, Japanese Patent Laying-Open No. 2010-34691 (hereinafter referred to as '691 Reference) discloses an image forming apparatus. In the image forming apparatus, on a screen image for setting two-sided printing displayed on a touch-panel, one-sided/one-sided key, one-sided/two-sided key, two-sided/two-sided key and two-sided/one-sided key as well as icons representing contents of processing corresponding to respective keys are displayed.

Japanese Patent Laying-Open No. 2007-329535 (hereinafter referred to as '535 Reference) discloses an image forming apparatus. In the image forming apparatus, on an icon display area of a basic screen image displayed on an operation display unit, a document icon representing the state of setting conditions related to two-sided document, and an output icon representing the state of setting of conditions related to two-sided print output are displayed, together with an arrow correlating these icons.

The techniques disclosed in '691 and '535 References display by icons the contents of respective two-sided copy processes. Only with such icons, however, it is still difficult for the user to understand the contents of two-sided/one-sided and one-sided/two-sided copy processes.

SUMMARY OF THE INVENTION

In view of the problem described above, it is desirable to provide an operation console and an image forming apparatus allowing the user to easily understand the contents of processes.

According to a first aspect, the present invention provides an operation console provided on an apparatus that executes a plurality of processes. The operation console includes: a display unit displaying a display screen image including a first area on which a plurality of virtual keys corresponding to respective ones of the plurality of processes for selecting any of the plurality of processes are displayed; a receiving unit receiving an input operation to the virtual keys; and a first display control unit responsive to the receiving unit receiving the input operation, for displaying, on a second area different from the first area of the display screen image, an image representing contents of the selected process in a prescribed state.

As described above, if any of the plurality of processes is selected, an image representing the contents of selected process is displayed in a prescribed state on the second area different from the first area on which the plurality of virtual keys are displayed. Therefore, it is possible for the user to easily understand the contents of selected process.

Preferably, the first display control unit displays the image representing contents of the selected process in a movie. Since the contents of selected process are displayed in detail, the user can more easily understand the contents of the selected process.

More preferably, the operation console further includes a second display control unit for displaying, next to one of the virtual keys in the first area, an icon indicating contents of processes corresponding to the one of the virtual keys. Therefore, by looking at the icon, the user can confirm the contents of the process corresponding to the virtual key, before selecting a desired process. Therefore, user convenience can be improved.

Further preferably, the image representing contents of the selected process includes an enlarged image of the icon indicating contents of the corresponding process. Therefore, it becomes easier to grasp the contents of the selected process. As a result, the user can more easily understand the contents of the selected process.

Preferably, the second display control unit includes a display changing unit, responsive to the receiving unit receiving the input operation, for displaying the icon in a prescribed less visibly recognizable manner. Therefore, if any of the plurality of processes is selected, the user more likely pays attention to the image indicating the contents of selected process displayed in the prescribed state, than the icon. Thus, it becomes easier for the user to understand the contents of selected process.

More preferably, the operation console further includes: an adding unit for adding a prescribed process to the selected process; and a reflecting unit for reflecting contents of the added process to the image representing the contents of the selected process. Therefore, the user can easily understand the contents of added process. Thus, user convenience can further be improved.

More preferably, the plurality of processes include at least: a one-sided/two-sided copy process for forming a two-sided copy from a one-sided document; and a two-sided/one-sided copy process for forming a one-sided copy from a two-sided document. Therefore, it is possible for the user to easily understand the contents of the above-described processes.

More preferably, the first display control unit displays, in response to the receiving unit receiving an input operation to the virtual key corresponding to the one-sided/two-sided copy process, images representing a state of images printed on two sides of a sheet of recording paper, as images representing contents of the selected process, in a prescribed state, on the second area. Therefore, it becomes possible for the user to easily understand the contents of one-sided/two-sided copy process, which are difficult to understand by icon display. As a result, user convenience can further be improved.

More preferably, the first display control unit displays, in response to the receiving unit receiving an input operation to the virtual key corresponding to the two-sided/one-sided

copy process, images representing a state of two images of one two-sided document respectively printed on one side of two sheets of recording paper, as images representing contents of the selected process, in a prescribed state, on the second area. Therefore, it becomes possible for the user to easily understand the contents of two-sided/one-sided copy process, which are difficult to understand by icon display. As a result, user convenience can further be improved.

More preferably, the second area is provided next to the first area. Thus, it becomes easier for the user to recognize the image representing the contents of the selected process.

According to a second aspect, the present invention provides an image forming apparatus executing a plurality of processes including image processing of image data, including: the above-described operation console; and a process executing unit for executing a process selected by the operation console. Since the image forming apparatus includes the operation console described above, it is possible to prevent erroneous selection of a process different from the intended process by the user. Thus, using the image forming apparatus, the user can execute the desired process easily.

According to a third aspect, the present invention provides a method of controlling an operation console provided on an apparatus that executes a plurality of processes, including the steps of displaying a display screen image including a first area in which a plurality of virtual keys corresponding to respective ones of the plurality of processes for selecting any of the plurality of processes are displayed; receiving an input operation to the virtual keys; and displaying, in response to reception of the input operation, on a second area different from the first area of the display screen image, an image representing contents of the selected process in a prescribed state.

Preferably, the display in a prescribed state is display in movie.

More preferably, the control method further includes the step of displaying, next to one of the virtual keys in the first area, an icon indicating contents of processes corresponding to the one of the virtual keys.

Further preferably, the image representing contents of the selected process includes an enlarged image of the icon indicating contents of the corresponding process.

Preferably, the step of displaying the icon includes the step of displaying the icon in a prescribed less visibly recognizable manner, in response to the receiving unit receiving the input operation.

More preferably, the control method further includes the steps of adding a prescribed process to the selected process; and reflecting contents of the added process to the image representing the contents of the selected process.

Further preferably, the plurality of processes include at least: a one-sided/two-sided copy process for forming a two-sided copy from a one-sided document; and a two-sided/one-sided copy process for forming a one-sided copy from a two-sided document.

Preferably, at the step of displaying the image representing contents of the selected process in a prescribed state, images representing a state of images printed on two sides of a sheet of recording paper are displayed as images representing contents of the selected process, in a prescribed state, on the second area, in response to reception of an input operation to the virtual key corresponding to the one-sided/two-sided copy process.

More preferably, at the step of displaying the image representing contents of the selected process in a prescribed state, images representing a state of two images of one two-sided document respectively printed on one side of two sheets of recording paper are displayed as images representing contents of the selected process, in a prescribed state, on the second area, in response to reception of an input operation to the virtual key corresponding to the two-sided/one-sided copy process.

According to the present invention, if any of a plurality of processes is selected, an image indicating the contents of selected process is displayed in a prescribed state on the second area different from the first area on which the plurality of virtual keys are displayed. Therefore, it is possible for the user to easily understand the contents of selected process.

The foregoing and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows an outer appearance of an image forming apparatus in accordance with an embodiment of the present invention.

FIG. **2** schematically shows an inner configuration of the image forming apparatus shown in FIG. **1**.

FIG. **3** is a block diagram showing an electrical configuration of the image forming apparatus shown in FIG. **1**.

FIG. **4** shows a basic layout configuration of a basic screen image for basic operational modes.

FIG. **5** shows an example of a copy mode basic screen image.

FIG. **6** shows an example of a two-sided copy setting screen image.

FIG. **7** is a flowchart representing a control structure of a computer program for realizing the two-sided copy setting process.

FIG. **8** shows an exemplary state of the two-sided copy setting screen image when a one-sided/two-sided key is pressed.

FIG. **9** shows a movie display of animation images representing one-sided/two-sided copy for horizontal binding.

FIG. **10** shows an exemplary state of the two-sided copy setting screen image when a one-sided/two-sided key is pressed.

FIG. **11** shows a movie display of animation images representing one-sided/two-sided copy for horizontal binding plus rotation by 180°.

FIG. **12** shows an exemplary state of the two-sided copy setting screen image when a two-sided/one-sided key is pressed.

FIG. **13** shows a movie display of animation images representing two-sided/one-sided copy for horizontal binding.

FIG. **14** shows an exemplary state of the two-sided copy setting screen image when a two-sided/one-sided key is pressed.

FIG. **15** shows a movie display of animation images representing two-sided/one-sided copy for horizontal binding plus rotation by 180°.

FIG. **16** shows a movie display of animation images representing one-sided/two-sided copy for vertical binding plus rotation by 180°.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following description, the same components are denoted by the same reference characters. Their names and functions are also the same. Therefore, detailed description thereof will not be repeated.

[Image Forming Apparatus **100**]

Referring to FIGS. **1** to **3**, an image forming apparatus **100** in accordance with an embodiment of the present invention is a Multifunction Printer (MFP) having scanner function, copy function, facsimile (hereinafter denoted as FAX) function and the like. When the user selects any of the operational modes including the scanner mode, copy mode and FAX mode, image forming apparatus **100** executes processes corresponding to the selected operational mode.

<Hardware Configuration>

[Operation Unit **120** of Image Forming Apparatus **100**]

Referring to FIGS. **1** and **3**, image forming apparatus **100** includes an operation unit **120**. Operation unit **120** is formed of a plate-shaped panel provided in an inclined manner to be easily viewable by the user on an upper front side of image forming apparatus **100**. Operation unit **120** includes a touch-panel display **130** and a display operation unit **140**. Touch-panel display **130** is arranged from the center to the left side on the surface of operation unit **120**. Display operation unit **140** is arranged on the right side on the surface of operation unit **120**. Touch-panel display **130** and display operation unit **140** are held in one housing and operation unit **120** is formed as one unit as a whole. Operation unit **120** communicates with a CPU (Central Processing Unit) **300**, which will be described later, through an input/output interface (not shown).

Touch-panel display **130** is a touch-panel-integrated liquid crystal display device, including a display panel **132** and a touch-panel **134** which are formed in a superposed manner. On display panel **132**, by way of example, a home screen image and a basic screen image are displayed. The home screen image allows selection of a desired operational mode from a plurality of operational modes executable by image forming apparatus **100**. The basic screen image allows setting changes of various functions in the basic operational modes. The basic operational modes refer to the operational modes for executing image processing such as printing and transmission of image data. In the present embodiment, the basic operational modes mean the copy mode, the FAX mode and the scanner mode. The operation of touch-panel display **130** is controlled by CPU **300**. By way of example, on the screen image displayed on display panel **132**, software keys are displayed. When the user presses any of the software keys, touch-panel **134** detects the pressed position. CPU **300** compares the display position of the software key and the pressed position of the touch-panel **134** on a program, and based on the result of comparison, selects an operational mode, changes settings of various functions and issues an operation instruction. The size and shape of touch-panel display **130** are not specifically limited. By way of example, one having a rectangular shape of 1024 pixels×600 pixels of landscape orientation may be used.

Display operation unit **140** includes a pilot lamp **142** and various hardware keys such as a power key **144**, an energy saving key **146** and a home key **148**. Pilot lamp **142** includes, for example, an LED (Light Emitting Diode), and it is on when the power of image forming apparatus **100** is on. Power key **144** is for turning on/off the power of image forming apparatus **100**.

Energy saving key **146** is for issuing an instruction to make a transition from a normal mode to an energy saving mode, or from the energy saving mode to the normal mode. Transition to the energy saving mode occurs not only when energy saving key **146** is pressed but also when a prescribed time passes without any user operation. The normal mode refers to a state in which the power is on and all operational modes are executable. The energy saving mode refers to a state in which the power is on and only some limited operational modes are executable.

Home key **148** is to issue an instruction to make a transition to the home screen image (not shown). When the user presses home key **148**, the home screen image (not shown) including software keys for selecting the above-described basic operational modes is displayed on display panel **132**.

When the user presses any of the software keys for selecting the basic operational modes displayed on the home screen image or the like as mentioned above, the basic screen image of the selected basic operational mode is displayed on display panel **132**.

[Basic Screen Images of Basic Operational Modes]

In the following, basic layout configurations of the basic screen images of basic operational modes will be described. Referring to FIG. **4**, the basic screen image of each operational mode includes five areas, that is, a system area **1000**, a function setting/confirmation area (hereinafter referred to as "function selecting area") **2000**, a preview area **3000**, an action panel area **4000** and a task trigger area **5000**. These five areas are arranged in the following manner, in accordance with a basic layout. Specifically, system area **1000** is arranged at the top of basic screen image. Preview area **3000** is arranged at the center of basic screen image. Function selecting area **2000** is arranged on the left side of preview area **3000** in the basic screen image. Action panel area **4000** is arranged on the upper right side of preview area **3000** in the basic screen image. Task trigger area **5000** is arranged on the lower right side of preview area **3000** in the basic screen image. The five areas forming the basic screen image of each operational mode and the basic layout are common in all operational modes. In the following, as an example of the basic screen image of basic operational mode, the basic screen image for the copy mode will be described.

[Copy Mode Basic Screen Image **6000**]

Referring to FIG. **5**, on system area **1000** of copy mode basic screen image **6000**, a character string **1102** of "copy", a log out key **1104** and the like are displayed. Character string **1102** indicates that it is the copy mode. Log out key **1104** is for executing log-out. On log out key **1104**, a logged-in user name is displayed. System area **1000** further includes an area **1106** indicating the current job status. In this area **1106**, an icon indicating that the copy process is being executed at present, and an icon indicating that the process is suspended (both not shown) are displayed.

On function selecting area **2000** of copy mode basic screen image **6000**, various setting keys for changing settings of various functions for executing the copy mode are displayed. In the present embodiment, as various setting keys, keys **2100** to **2114** are displayed. Key **2100** is for changing the number of copies. Key **2102** is for changing color mode. Key **2104** is for changing copy density. Key **2106** is for changing copy magnification. Key **2108** is for changing document size. Key **2110** is for changing the size of recording paper to be used. Key **2112** is for setting the two-sided copy function. Key **2114** is for setting the stapling function. On keys **2102** to **2114**, simple pictures and character sequences representing the function corresponding to each key are displayed. By way of example, on key **2102**, a picture representing the function of changing the number of copies, a character sequence of "copy number" and the numerical value representing the set number of copies are displayed. If the user touches any of keys **2102** to **2114**, a setting screen image corresponding to the pressed key (for example, copy number setting screen image, density setting screen image, magnification setting screen image, or document setting image (all not shown)) is displayed. In the

present embodiment, on function selecting area **2000**, a binding direction setting key (not shown) is also displayed, for setting the direction of binding. The binding direction means the direction of two-page spread of the output two-sided print (vertical or horizontal). When the user presses the binding direction setting key, a binding direction setting screen image for setting the binding direction appears on display panel **132**. If the setting of binding direction is not changed by the user, horizontal binding is set as default setting.

Below the setting keys **2100** to **2114** described above in function selecting area **2000**, change keys **2012** to **2016** are displayed, for changing the display style of setting keys **2100** to **2114**. Change key **2012** is for displaying setting keys related to functions registered in advance as "favorites." Change key **2014** is for displaying only the setting keys related to a function of which setting has been changed. Change key **2016** is for displaying setting keys related to all functions of which setting can be changed in the designated operational mode. In the present embodiment, it is assumed that change key **2016** is selected and the setting keys related to all functions of which setting can be changed in the copy mode are displayed in the function selecting area **2000**.

If not all setting keys to be displayed can be displayed in function selecting area **2000**, various setting keys are displayed in upward/downward scrollable manner. Here, the display positions of change keys **2012** to **2016** are fixed. The user may switch the display portion of various setting keys upward/downward by, for example, a flick operation (an operation of lightly sweeping the display portion with a finger in a prescribed direction).

On preview area **3000** of copy mode basic screen image **6000**, a mimic image **3102** representing the current status of overall image forming apparatus **100** is displayed. By a touch operation (an operation of pressing a display portion with a finger) on mimic image **3102**, the user can have the paper setting screen image displayed on display panel **132**. At the time of scan-in process, a preview image based on the scan data read by document reading unit **102** is displayed on preview area **3000**.

On action panel area **4000** of copy mode basic screen image **6000**, various execution keys for executing recommended functions in the copy mode are displayed. The recommended functions refer to functions selected in the past in combination with the function selected by the user. In the present embodiment, as various execution keys, keys **4102** to **4114** are displayed. Key **4102** is for automatically selecting copy magnification in accordance with the recording paper used. Key **4104** is for executing registration of current setting condition (job program). Key **4106** is for executing image data filing. Key **4108** is for executing transmission of image data simultaneously with the copy process. Key **4110** is for executing section insertion. Key **4112** is for executing section deletion. Key **4114** is for displaying a screen image showing contents of the scan-in process.

On task trigger area **5000** of copy mode basic screen image **6000**, a scan-in key **5102**, a clear-all key **5104**, a monochrome start key **5106** and a color start key **5108** are displayed. Scan-in key **5102** is for starting execution of a scan-in process. In the scan-in process, a document is scanned and a preview image based on the obtained scan data is displayed on preview area **3000**. Clear-all key **5104** cancels all functions and parameters of which settings have been changed, and returns the settings to the default state. Monochrome start key **5106** is for starting execution of a monochrome copy process in which a document is scanned and a monochrome copy is taken based on the obtained image data (or on scan data obtained by the scan-in process). Color start key **5108** is for starting a color copy process in which a document is scanned and a color copy is taken based on the obtained image data (or on scan data obtained by the scan-in process). As described above, in the present specification, the image data scanned by the scan-in process is referred to as "scan data" and distinguished from other image data.

When the user presses key **2112** for setting the two-sided copy function displayed on function selecting area **2000** of copy mode basic screen image **6000**, the two-sided copy setting screen image is displayed on the front side of copy mode basic screen image **6000**. In the following, an example of the two-sided copy setting screen image will be described.

[Two-Sided Copy Setting Screen Image **7000**]

Referring to FIG. **6**, on two-sided copy setting screen image **7000**, keys **7100** to **7106** are displayed. One-sided/one-sided key **7100** is for setting the one-sided/one-sided copy. One-sided/two-sided key **7102** is for setting the one-sided/two-sided copy. Two-sided/two-sided key **7104** is for setting the two-sided/two-sided copy. Two-sided/one-sided key **7106** is for setting the two-sided/one-sided copy. In the following, these keys may generally be referred to as "two-sided copy setting keys." On two-sided copy setting keys **7100** to **7106**, character strings representing the set contents corresponding to respective keys, and virtual pilot lamps **7300** to **7306** are displayed, respectively. Virtual pilot lamps **7300** to **7306** are displayed in yellow if the corresponding two-sided copy setting keys **7100** to **7106** are in the selected state (hereinafter referred to as "on"). Virtual pilot lamps **7300** to **7306** are displayed in black if the corresponding two-sided copy setting keys **7100** to **7106** are not in the selected state (hereinafter referred to as "off"). Simple pictures representing the set contents corresponding to respective keys are displayed as icons **7200** to **7206**, in the vicinity of two-sided copy setting keys **7100** to **7106**. In the following, the area in which two-sided copy setting keys **7100** to **7106** and icons **7200** to **7206** are displayed will be referred to as "still image display area."

On two-sided copy setting screen image **7000**, a check box **7400** and a close button **7402** are further displayed. Check box **7400** is for setting "180° rotated copy", in which an image on the rear surface is printed with its direction rotated by 180°. Close button **7402** is for closing two-sided copy setting screen image **7000**. When the user touches check box **7400**, a check mark is displayed in check box **7400**. On two-sided copy setting screen image **7000**, a movie display area **7500** is further provided. On movie, display area **7500**, animation images are displayed as a movie, for demonstrating in detail contents of some setting (one-sided/two-sided copy, two-sided/one-sided copy, or the like). Movie display area **7500** is provided near the still image display area (in the present embodiment, at a neighboring position). Specifically, the animation is displayed close to the two-sided copy setting keys **7100** to **7106** and the icons **7200** to **7206**, to be easily recognized by the user.

It is assumed that, if the setting of two-sided copy function is not changed by the user, one-sided/one-sided copy is set as default setting.

[Overall Configuration of Image Forming Apparatus **100**]

Referring to FIGS. **1** to **3**, image forming apparatus **100** includes, in addition to operation unit **120** described above, a document reading unit **102**, an image forming unit **104**, a paper feed unit **106**, and a paper discharge unit **108**. In the following, operations in the copy mode and the FAX mode will be described, to illustrate the overall hardware configuration of image forming apparatus **100**.

—Copy Mode—

In the present embodiment, in the copy mode, document reading unit **102** and image forming unit **104** mainly operate to execute any of the scan-in process, mono-copy process and color copy process.

(Scan-in Process)

When the copy mode is selected by a user operation on the home screen image and scan-in key **5102** is touched, a document placed manually or by an ADF (Auto Document Feeder) on a platen is read as scan data by document reading unit **102**. The read scan data is input to CPU **300**. CPU **300** performs various image processing operations on the input scan data, and displays a preview image based on the scan data, on preview area **3000** of copy mode basic screen image **6000**. At this time, the scan data is temporarily stored in a storage device (for example, in an RAM (Random Access Memory) **308** shown in FIG. **3**).

(Normal Monochrome Copy Process and Color Copy Process)

When the copy mode is selected by a user operation on the home screen image and a monochrome start key **5106** or a color start key **5108** is touched while the scan-in process described above is not being done, a document placed manually or by an ADF on a platen is read as image data by document reading unit **102**. The read image data is input to CPU **300** implemented, for example, by a microcomputer, shown in FIG. **3**, and subjected to various image processing operations. Then, the image data is output to image forming unit **104**.

Image forming unit **104** is for printing an image of the document based on the image data on a recording medium (in most cases, on a sheet of recording paper). Image forming unit **104** includes a photoreceptor drum **222**, a charger **224**, a laser scanning unit (hereinafter denoted as LSU) **226**, a developer **228**, a transfer device **230**, a cleaning device **232**, a fixing device **234** and a neutralizer (not shown).

In image forming unit **104**, a main feeding path **236** and a reverse feeding path **238** are provided. Paper feed unit **106** draws out sheets of recording paper stacked on a paper feed cassette **240** or on a manual feed tray **242** one by one, and feeds the sheet of paper to main feeding path **236** of image forming unit **104**. The sheet of recording paper fed from paper feed unit **106** is fed along main feeding path **236**.

While the sheet of recording paper is fed along main feeding path **236**, the sheet passes between photoreceptor drum **222** and transfer device **230**, and further passes through fixing device **234**, whereby printing is done on the sheet of recording paper.

Photoreceptor drum **222** rotates in one direction, and its surface is cleaned by cleaning device **232** and the neutralizer and, thereafter, uniformly charged by charger **224**.

LSU **226** modulates the laser beam based on the image data to be printed, and repeatedly scans the surface of photoreceptor drum **222** with the modulated laser beam in a main scanning direction, whereby an electrostatic latent image is formed on the surface of photoreceptor drum **222**.

Developer **228** develops the electrostatic latent image by supplying toner to the surface of photoreceptor drum **222**, and thus, a toner image is formed on the surface of photoreceptor drum **222**. When the monochrome copy process is executed, developer **228** supplies monochrome toner. When the color copy process is executed, developer **228** supplies color toner including yellow (Y), magenta (M), cyan (C) and black (K).

Transfer device **230** transfers the toner image on the surface of photoreceptor drum **222** to the sheet of recording paper passing between transfer device **230** and the photoreceptor drum **222**.

Fixing device **234** includes a heating roller **248** for heating the sheet of recording paper and a pressure roller **250** for pressing the sheet of recording paper. As the sheet of recording paper is heated by heating roller **248** and pressed by pressure roller **250**, the toner image that has been transferred to the sheet of recording paper is fixed on the sheet. A heater provided in heating roller **248** is heated by electric power supplied to fixing device **234** and controlled such that temperature of heating roller **248** attains to an appropriate temperature for fixing.

At a position of connection between main feeding path **236** and reverse feeding path **238**, a separation pawl **244** is arranged. When printing is done only on one side of the sheet of recording paper, separation pawl **244** is so positioned that the sheet of recording paper fed from fixing device **234** is guided to paper discharge tray **246** or a paper discharge unit **108**.

When printing is done on both sides of the sheet of recording paper, separation pawl **244** is turned from the above-described state to a prescribed direction, so that the sheet of recording paper is guided to reverse feeding path **238**. The sheet of recording paper passes through reverse feeding path **238**, turned upside-down and again fed to main feeding path **236**, and while it is again fed along main feeding path **236**, printing is done on its rear surface, and thereafter the sheet is guided to paper discharge tray **246** or to paper discharge unit **108** by separation pawl **244** returned to the original state.

The sheet of recording paper printed in the above-described manner is guided to paper discharge tray **246** or to paper discharge unit **108**, and discharged to paper discharge tray **246** or to any of paper discharge trays **110** of paper discharge unit **108**.

Paper discharge unit **108** may perform a process of sorting a plurality of printed sheets of paper to be output to different discharge trays **110**, a process of punching each sheet of recording paper or a process of stapling the sheets of recording paper. The mechanism for punching and stapling is not shown. Assume that a number of copies of the printing are to be prepared. In that case, sheets of recording paper are sorted and discharged to paper discharge trays **110** such that each tray **110** contains each set of printed sheets, and the set of printed sheets in each tray **110** is stapled or punched.

(Monochrome Copy Process and Color Copy Process after Scan-in Process)

When the copy mode is selected on the home screen image, the scan-in process described above is done and thereafter, monochrome start key **5106** or a color start key **5108** may be touched. In such a case, scanning of the document image and the image processing on the image data described above do not take place, and image forming unit **104** performs the image forming process in the similar manner as described above on the scan data that has been read in the scan-in process and stored temporarily in the storage device.

—FAX Mode—

In the present embodiment, in the FAX mode, FAX communication process is executed by the operation of FAX communication unit **160**. Therefore, the scan-in process and the FAX transmission process are executed by the operations of document reading unit **102** and FAX communication unit **160** shown in FIG. **3**. Further, the FAX reception process is executed by the operations of FAX communication unit **160** and image forming unit **104**.

(Scan-in Process)

When the FAX mode is selected on the home screen image and the scan-in key (not shown) displayed on the basic screen image of FAX mode (not shown) is touched, a document placed manually or by an ADF on a platen is read as scan data

by document reading unit **102**. The read scan data is input to CPU **300**. CPU **300** performs various image processing operations on the input scan data, and displays a preview image based on the scan data, on preview area **3000** of FAX mode initial screen image (not shown). Here, the scan data is temporarily stored in a storage device (for example, in RAM **308** shown in FIG. **3**).

(Normal FAX Transmission Process)

When the FAX mode is selected on the home screen image and a start key (not shown) displayed on the FAX mode basic screen image (not shown) is touched while the scan-in process is not being done, a document placed manually or by an ADF on a platen is read as image data by document reading unit **102**. The read image data is input to CPU **300**, and subjected to various image processing operations. Then, the image data is output to FAX communication unit **160**.

On the other hand, when the FAX mode is selected on the home screen image, the scan-in process described above is done and thereafter, the start key (not shown) may be touched. In such a case, scanning of the document image and the image processing on the image data described above do not take place, and the scan data that has been read in the scan-in process temporarily stored in the storage device is output to FAX communication unit **160**.

FAX communication unit **160** of image forming apparatus **100** on the transmitting side connects a transmitting side line to a designated transmission destination. FAX communication unit **160** converts the input image data or scan data to communication data in compliance with facsimile transmission standard, and transmits the converted data to a facsimile machine (such as an image forming apparatus **100** having the facsimile function) on the receiving side.

(FAX Communication Process)

When the line is connected, a FAX communication unit **160** of image forming apparatus **100** on the receiving side detects a communication request signal from FAX communication unit **160** of image forming apparatus **100** on the transmitting side, and transmits an acknowledgement signal. Thereafter, by way of example, FAX communication units **160** on the transmitting and receiving sides pass performance information supported by transmitting side and receiving side, determine highest possible speed of communication and method of coding/code correction of image data, and set the method of communication of modems. Then, using the image signal format in compliance with the communication method, data is transmitted from FAX communication unit **160** of image forming apparatus **100** on the transmitting side to FAX communication unit **160** of image forming apparatus **100** on the receiving side. When transmission ends, the line is disconnected.

(FAX Reception Process)

FAX communication unit **160** of image forming apparatus **100** on the receiving side converts the received data to image data and passes the data to an image forming unit **104**. The received data may be converted to image data at the image forming unit **104**. The image forming unit **104** prints an image of a document based on the image data converted from the received data on a sheet of recording paper, in a manner similar to the operation in the copy mode described above.

<Electrical Configuration>

Referring to FIG. **3**, image forming apparatus **100** includes: operation unit **120**, an ROM (Read Only Memory) **306**, an HDD (Hard Disk Drive) **302**, and an RAM **308**. ROM **306** stores a program or programs. HDD **302** includes a hard disk providing a non-volatile storage area capable of storing programs and data even when power supply is shut off. RAM **308** provides a storage area when a program is executed.

Image forming apparatus **100** further includes a bus **310** and CPU **300**. Bus **310** is connected to document reading unit **102**, image forming unit **104**, FAX communication unit **160**, operation unit **120**, HDD **302**, ROM **306**, RAM **308**, and network interface (hereinafter referred to as "network I/F") **304**. CPU **300** is connected to bus **310** and controlling these units and components for realizing general functions of the image forming apparatus.

HDD **302** stores various data such as the image data scanned by document reading unit **102**. HDD **302** further stores animation images for the one-sided/two-sided copy, animation images for the two-sided/one-sided copy, animation images for the one-sided/two-sided copy plus rotation by 180°, and animation images for two-sided/one-sided copy plus rotation by 180°. For each of these animations, HDD **302** stores two types of images, that is, for vertical binding and horizontal binding. Specifically, HDD **302** stores a total of eight different animations. Details of the animation images will be described later.

ROM **306** stores computer programs for realizing general operations of image forming apparatus **100** as well as a computer program for realizing the two-sided copy setting process, which will be described later. ROM **306** further stores basic screen image data for displaying basic screen images for various operational modes and setting screen image data for displaying various setting screen images.

RAM **308** provides a function of a working memory temporarily storing results of operations and processes by CPU **300**, and a function of a frame memory for storing image data. CPU **300** executes control related to various functions of image forming apparatus **100** in accordance with computer programs stored in ROM **306**. Specifically, control of various units including document reading unit **102**, image forming unit **104**, touch-panel display **130** and display operation unit **140** of operation unit **120**, HDD **302**, ROM **306** and RAM **308** is realized by CPU **300** executing a prescribed computer program.

As shown in FIG. **3**, a public line is connected for transmitting/receiving image data, to FAX communication unit **160** of image forming apparatus **100**. To network I/F **304**, a network line is connected. To the network line, a computer is connected. The computer uses image forming apparatus **100** as a network-supported printer. The computer is identified by a URL designated through the Internet. When connected to the Internet through the network line, image forming apparatus **100** can obtain necessary information through the Internet.

<Software Configuration>

(Two-Sided Copy Setting Process)

A program for realizing the two-sided copy setting process is activated when key **2112** for setting the two-sided copy function, displayed on function selecting area **2000** of copy mode basic screen image **6000**, is pressed.

Referring to FIG. **7**, the program includes steps **S1000** and **S1001**. At step **S1000**, CPU **300** displays two-sided copy setting screen image **7000** (see FIG. **6**) for setting the two-sided copy function, in front of copy mode basic screen image **6000**. At step **S1001**, CPU **300** determines whether or not any of the two-sided copy setting keys displayed on two-sided copy setting screen image **7000** is pressed. CPU **300** repeats step **S1001** until any of the two-sided copy setting keys is pressed.

The program further includes a step **S1002**. Step **S1002** is executed if it is determined at step **S1001** that any of the two-sided copy setting keys is pressed (YES). At step **S1002**, CPU **300** temporarily determines contents of setting related

to the two-sided copy, based on the set binding direction, pressed key and whether or not check box **7400** is checked.

The program further includes steps **S1003**, **S1004** and **S1005**. At step **S1003**, CPU **300** displays the virtual pilot lamp of the pressed two-sided copy setting key in yellow (on). At step **S1004**, CPU **300** darkens the color of an icon displayed close to the pressed two-sided copy setting key. At step **S1005**, CPU **300** executes the display process in accordance with the set contents temporarily determined at step **S1002**. At step **S1004**, the icon is displayed in a dark color such as black or gray, which is difficult to recognize visually. At step **S1005**, if the set contents correspond to one-sided/two-sided copy or two-sided/one-sided copy, corresponding animation images are read from HDD **302**. The read animation images are displayed as a movie on movie display area **7500**. On the other hand, if the set contents are one-sided/one-sided copy or two-sided/two-sided copy, nothing is displayed on movie display area **7500**.

The program further includes steps **S1006** and **S1007**. At step **S1006**, CPU **300** determines which of the two-sided copy setting keys displayed on two-sided copy setting screen image has been pressed. CPU **300** repeats step **S1006** until any of the two-sided copy setting keys is pressed. Step **S1007** is executed if it is determined at step **S1006** that any of the two-sided copy setting keys is pressed (YES). At step **S1007**, CPU **300** determines whether or not the pressed two-sided copy setting key and the state of check box **7400** (checked or not) are different from those of the last operation. If it is determined at step **S1007** that the pressed two-sided copy setting key and the state of check box **7400** are different from those of the last operation (YES), the control returns to step **S1002**.

The program further includes a step **S1008**. Step **S1008** is executed if it is determined at step **S1007** that the pressed two-sided copy setting key and the state of check box **7400** are the same as those of the last operation (NO). At step **S1008**, CPU **300** determines whether or not a reset key (in the present embodiment, clear-all key **5104** displayed on task trigger area **5000**) is pressed within a prescribed time period.

The program further includes steps **S1009** and **S1010**. Step **S1009** is executed if it is determined at step **S1008** that a reset key is pressed within the prescribed time period (YES). At step **S1009**, CPU **300** finally fixes the two-sided copy function to the default setting of one-sided/one-sided copy. Step **S1010** is executed if it is determined at step **S1008** that the reset key has not been pressed within the prescribed time period (NO). At step **S1010**, CPU **300** finally fixes the two-sided copy function to the set contents that have been tentatively determined at step **S1002**.

The program ends when the user presses close button **7402**.

<Operation>

Referring to FIGS. **1** to **16**, image forming apparatus **100** operates in the following manner. General operations of image forming apparatus **100** except for the following operation are the same as those of conventional image forming apparatuses. In the following operation, it is assumed that image forming apparatus **100** is powered on.

The user presses home key **148** of display operation unit **140**. When home key **148** is pressed, the home screen image (not shown) is displayed on display panel **132**. The user presses a software key for selecting the copy mode, displayed on the home screen image. When the software key for selecting the copy mode is pressed, copy mode basic screen image **6000** (see FIG. **5**) is displayed on display panel **132**.

The user confirms the copy mode basic screen image **6000**. If necessary, the user makes an input operation or operations on various setting keys, to change settings of various functions related to the copy mode. In the present embodiment, the user presses key **2100** for changing the number of copies, displayed on function selecting area **2000**. When key **2100** is pressed, a copy number setting screen image (not shown) including a group of virtual ten keys for changing the number of copies is displayed in front of copy mode basic screen image **6000**. The user sets a desired number of copies (in the present embodiment, 14) by an input operation on the copy number setting screen image. Here, it is assumed that the user does not change the setting of binding direction, and the binding direction is kept to the default setting of horizontal binding.

The user further presses key **2112** for setting the two-sided copy function displayed on function selecting area **2000**. When key **2112** is pressed, two-sided copy setting screen image **7000** (see FIG. **6**) is displayed in front of copy mode basic screen image **6000** (step **S1000**).

The user presses one-sided/two-sided key **7102** for setting the one-sided/two-sided copy displayed on two-sided copy setting screen image **7000**. At this time, it is assumed that check box **7400** is not checked. When one-sided/two-sided key **7102** is pressed (YES at step **S1001**), CPU **300** tentatively determines the contents of setting related to the two-sided copy, based on the set binding direction, pressed key and whether or not check box **7400** is checked (step **S1002**). Here, as the set contents, one-sided/two-sided copy for horizontal binding are tentatively determined.

When the set contents are tentatively determined, CPU **300** displays virtual pilot lamp **7302** of pressed one-sided/two-sided key **7102** in yellow (on) (step **S1003**). In addition, CPU **300** darkens (in the present invention, turns to gray) the color of display of icon **7202** displayed close to the pressed one-sided/two-sided key **7102** (step **S1004**).

CPU **300** further executes a display process in accordance with the tentatively determined set contents (step **S1005**). Here, the set contents are one-sided/two-sided copy for horizontal binding and, therefore, CPU **300** reads the animation images for the one-sided/two-sided copy for horizontal binding from HDD **302**, and displays the first image of the animation on movie display area **7500** (see FIG. **8**). Referring to FIG. **8**, the first image of animation is an enlargement of icon **7202**. CPU **300** further displays the movie of animation on movie display area **7500**. Referring to FIG. **9**, on movie display area **7500**, animation images for the one-sided/two-sided copy for horizontal binding are displayed one after another, first from (A) to (F) of FIG. **9**, and thereafter from (F) to (A) of FIG. **9**. By the animation images, the state of images to be printed on two sides of the recording paper can be seen in detail. When the series of movie display ends, the animation images are erased from movie display area **7500**.

After confirming the animation images for the one-sided/two-sided copy for horizontal binding, the user checks check box **7400** displayed on two-sided copy setting screen image **7000**, and again presses one-sided/two-sided key **7102**. When one-sided/two-sided key **7102** is pressed (YES at **S1006**), CPU **300** determines whether or not the pressed two-sided copy setting key and the state of check box **7400** (checked or not) are different from those of the last operation (step **S1007**). Here, the pressed two-sided copy setting key is the same as the key pressed last time. However, the state of check box **7400** is different from the last time. Therefore, CPU **300** makes a determination that the pressed two-sided copy setting key or state of check box **7400** is different from the last operation (YES at step **S1007**). Then, based on the set binding direction, pressed key and whether check box **7400** is checked or not, CPU **300** tentatively determines the set contents related to the two-sided copy (step **S1002**). Here, as the set

contents, one-sided/two-sided copy for horizontal binding plus rotation by 180° are determined tentatively.

When the set contents are determined tentatively, CPU **300** displays the virtual pilot lamp **7302** of pressed one-sided/two-sided key **7102** in yellow (on) (step S**1003**). In addition, CPU **300** darkens (in the present invention, turns to gray) the color of display of icon **7202** displayed close to the pressed one-sided/two-sided key **7102** (step S**1004**).

CPU **300** further executes a display process in accordance with the tentatively determined set contents (step S**1005**). Here, the set contents are one-sided/two-sided copy for horizontal binding plus rotation by 180° and, therefore, CPU **300** reads animation images for one-sided/two-sided copy for horizontal binding plus rotation by 180° from HDD **302**, and displays the first image of the animation on movie display area **7500** (see FIG. **10**). Referring to FIG. **10**, the first image of animation is an enlargement of icon **7202**. CPU **300** further displays the movie of animation on movie display area **7500**. Referring to FIG. **11**, on movie display area **7500**, animation images for the one-sided/two-sided copy for horizontal binding plus rotation by 180° are displayed one after another, first from (A) to (F) of FIG. **11**, and thereafter from (F) to (A) of FIG. **11**. By the animation images, the state of images to be printed on two sides of the recording paper can be seen in detail. When the series of movie display ends, the animation images are erased from movie display area **7500**.

After confirming the animation images for the one-sided/two-sided copy for horizontal binding plus rotation by 180°, the user presses two-sided/one-sided key **7106** for setting the two-sided/one-sided copy displayed on two-sided copy setting screen image **7000**. Here, it is assumed that check box **7400** is not checked. When two-sided/one-sided key **7106** is pressed (YES at S**1006**), CPU **300** determines whether or not the pressed two-sided copy setting key and the state of check box **7400** (checked or not) are different from those of the last operation (step S**1007**). Here, the pressed two-sided copy setting key is different from the key pressed last time and the state of check box **7400** is different from the last time. Therefore, CPU **300** makes a determination that the pressed two-sided copy setting key and state of check box **7400** are different from those of the last operation (YES at step S**1007**). Then, based on the set binding direction, pressed key and whether check box **7400** is checked or not, CPU **300** tentatively determines the set contents related to the two-sided copy (step S**1002**). Here, as the set contents, two-sided/one-sided copy for horizontal binding are determined tentatively.

When the set contents are determined tentatively, CPU **300** displays the virtual pilot lamp **7306** of pressed two-sided/one-sided key **7106** in yellow (on) (step S**1003**). In addition, CPU **300** darkens (in the present invention, turns to gray) the color of display of icon **7206** displayed close to the pressed two-sided/one-sided key **7106** (step S**1004**).

CPU **300** further executes a display process in accordance with the tentatively determined set contents (step S**1005**). Here, the set contents are two-sided/one-sided copy for horizontal binding. Therefore, CPU **300** reads animation images for two-sided/one-sided copy for horizontal binding from HDD **302**, and displays the first image of the animation on movie display area **7500** (see FIG. **12**). Referring to FIG. **12**, the first image of animation is an enlargement of icon **7206**. CPU **300** further displays the movie of animation on movie display area **7500**. Referring to FIG. **13**, on movie display area **7500**, animation images for the two-sided/one-sided copy for horizontal binding are displayed one after another, first from (A) to (C) of FIG. **13**, and thereafter from (C) to (A) of FIG. **13**. By the animation images, the state of two images on one two-sided document to be printed on one side of two sheets of recording paper can be seen in detail. When the series of movie display ends, the animation images are erased from movie display area **7500**.

After confirming the animation images for the two-sided/one-sided copy for horizontal binding, the user checks check box **7400** displayed on two-sided copy setting screen image **7000**, and again presses two-sided/one-sided key **7106**. When two-sided/one-sided key **7106** is pressed (YES at S**1006**), CPU **300** determines whether or not the pressed two-sided copy setting key and the state of check box **7400** (checked or not) are different from those of the last operation (step S**1007**). Here, the pressed two-sided copy setting key is the same as the key pressed last time. However, the state of check box **7400** is different from the last time. Therefore, CPU **300** makes a determination that the pressed two-sided copy setting key or the state of check box **7400** is different from the last operation (YES at step S**1007**).

Then, based on the set binding direction, pressed key and whether check box **7400** is checked or not, CPU **300** tentatively determines the set contents related to the two-sided copy (step S**1002**). Here, as the set contents, two-sided/one-sided copy for horizontal binding plus rotation by 180° are determined tentatively.

When the set contents are tentatively determined, CPU **300** displays virtual pilot lamp **7306** of pressed two-sided/one-sided key **7106** in yellow (on) (step S**1003**). In addition, CPU **300** darkens (in the present invention, turns to gray) the color of display of icon **7206** displayed close to the pressed two-sided/one-sided key **7106** (step S**1004**).

CPU **300** further executes a display process in accordance with the tentatively determined set contents (step S**1005**). Here, the set contents are two-sided/one-sided copy for horizontal binding plus rotation by 180° and, therefore, CPU **300** reads animation images for two-sided/one-sided copy for horizontal binding plus rotation by 180° from HDD **302**, and displays the first image of the animation on movie display area **7500** (see FIG. **14**). Referring to FIG. **14**, the first image of animation is an enlargement of icon **7206**. CPU **300** further displays the movie of animation on movie display area **7500**. Referring to FIG. **15**, on movie display area **7500**, animation images for the two-sided/one-sided copy for horizontal binding plus rotation by 180° are displayed one after another, first from (A) to (H) of FIG. **15**, and thereafter from (H) to (A) of FIG. **15**. By the animation images, the state of two images on one two-sided document to be printed on one side of two sheets of recording paper can be seen in detail. When the series of movie display ends, the animation images are erased from movie display area **7500**.

After confirming the animation images for the two-sided/one-sided copy for horizontal binding, the user presses two-sided/one-sided key **7106**. Here, it is assumed that check box **7400** is kept checked. When two-sided/one-sided key **7106** is pressed (YES at S**1006**), CPU **300** determines whether or not the pressed two-sided copy setting key and the state of check box **7400** are different from those of the last operation (step S**1007**).

Here, the pressed two-sided copy setting key is the same as the key pressed last time, and the state of check box **7400** is also the same as the last time. Therefore, CPU **300** makes a determination that the pressed two-sided copy setting key and state of check box **7400** are the same as those of the last operation (NO at step S**1007**). If it is further determined that the reset key has not been pressed within a prescribed time period (NO at step S**1008**), CPU **300** finally fixes the tentatively determined set contents related to two-sided copy, to be the two-sided/one-sided copy plus rotation by 180° as the

two-sided copy function (step S1010). In the present embodiment, the reset key is a clear-all key **5104** displayed on task trigger area **5000**.

If the reset key (in the present embodiment, the reset key is a clear-all key **5104** displayed on task trigger area **5000**) is pressed by the user within a prescribed time period (YES at step S1008), CPU **300** finally fixes the two-sided copy function to the default setting of one-sided/one-sided copy (step S1009).

After changing the setting of two-sided copy function or functions, the user presses any of scan-in key **5102**, monochrome start key **5106** or color start key **5108** displayed on task trigger area **5000**. Thus, a desired process (scan-in process, monochrome copy process or color copy process) is executed.

In the operation described above, if the user presses one-sided/one-sided key **7100** or two-sided/two-sided key **7104**, CPU **300** does not execute any special display process in accordance with the tentatively determined set contents. Therefore, nothing is displayed on movie display area **7500**.

In the above-described operation, if the user changes the setting of binding direction in advance (specifically, if vertical binding is set), CPU **300** reads images for the vertical binding as the corresponding animation images, and displays the images on movie display area **7500**. By way of example, if the tentatively determined set contents are one-sided/two-sided copy for vertical direction plus rotation by 180°, CPU **300** reads animation images for one-sided/two-sided copy for vertical binding plus rotation by 180° from HDD **302**, and displays the first image of the animation on movie display area **7500** (see FIG. **10**). Referring to FIG. **10**, the first image of animation is an enlargement of icon **7206**. CPU **300** further displays the movie of animation on movie display area **7500**. Referring to FIG. **16**, on movie display area **7500**, animation images for the one-sided/two-sided copy for vertical binding plus rotation by 180° are displayed one after another, first from (A) to (F) of FIG. **16**, and thereafter from (F) to (A) of FIG. **16**. By the animation images, the state of images to be printed on two sides of the recording paper can be seen in detail. When the series of movie display ends, the animation images are erased from movie display area **7500**.

As described above, if the tentatively determined contents are one-sided/two-sided copy for horizontal binding, the image representing the state of recording paper after two-sided copy is rotated to the horizontal direction in the animation (see FIGS. **9** and **11**). On the other hand, if the tentatively determined set contents are one-sided/two-sided copy for vertical, binding, the image representing the state of recording paper after two-sided copy is rotated to the vertical direction in the animation (see FIG. **16**). Therefore, the user can easily understand the direction of page spread of the printed two-sided document.

<Function/Effect>

According to the embodiment above, operation unit **120** is an operation console provided on image forming apparatus **100** for executing a plurality of processes. On operation unit **120**, display panel **132** displays two-sided copy setting screen image **7000** including a still image display area on which a plurality of software keys (two-sided copy setting keys **7100** to **7106**) are displayed. The plurality of software keys correspond to respective ones of the plurality of processes (one-sided/one-sided copy, one-sided/two-sided copy, two-sided/two-sided copy and two-sided/one-sided copy), for selecting any of the plurality of functions. Touch-panel **134** receives input operations to the plurality of software keys. In response to an input operation on touch-panel **134**, CPU **300** displays images representing the contents of selected process on movie display area **7500** different from the still image display area, on two-sided copy setting screen image **7000**.

As described above, if any of the plurality of processes is selected, images representing the contents of selected process are displayed in a prescribed state on movie display are **7500** different from the still image display area. Therefore, the user can easily understand the contents of the selected process.

Further, according to the embodiment above, if any of one-sided/two-sided copy process and two-sided/one-sided copy process is selected, CPU **300** displays animation images representing the contents of selected process on movie display area **7500**. Thus, the contents of selected process are displayed in detail and, the user can more easily understand the contents of selected process.

More specifically, when the one-sided/two-sided copy process is selected (when one-sided/two-sided key **7102** is pressed), CPU **300** displays images representing the state of images printed on two sides of recording paper, as the images representing the contents of selected process, in a movie (see FIGS. **9**, **11** and **16**). When the two-sided/one-sided copy process is selected (when two-sided/one-sided key **7106** is pressed), CPU **300** displays images representing the state of two images of one two-sided document-printed on one side of two sheets of recording paper, as the images representing the contents of selected process, in a movie (see FIGS. **13** and **15**). Thus, the user can easily understand the contents of one-sided/two-sided copy and two-sided/one-sided copy that are hard to understand from icon displays. As a result, user convenience can further be improved.

Further, according to the embodiment described above, in the vicinity of two-sided copy setting keys **7100** to **7106** on the still image display area, icons **7200** to **7206** representing contents corresponding to the two-sided copy setting keys **7100** to **7106** are displayed. Therefore, by looking at ions **7200** to **7206**, it is possible for the user to confirm the contents of processes corresponding to two-sided copy setting keys **7100** to **7106** before selecting a desired process. As a result, user convenience can further be improved.

Further, according to the embodiment above, the image representing the contents of selected process includes an image of enlarged icon **7202** or **7206**, representing the contents of corresponding process (see FIGS. **8**, **10**, **12** and **14**). Consequently, it becomes easier to grasp the contents of the selected process and, therefore, the user can more easily understand the contents of the selected process.

Further, according to the embodiment above, in response to touch-panel **134** receiving an input operation to two-sided copy setting keys **7100** to **7106**, CPU **300** darkens the display color of icons **7200** to **7206**. Consequently, if any of the plurality of processes is selected, it becomes easier for the user to notice the image representing the contents of selected process displayed in a prescribed state, rather than the icons **7200** to **7206**. Therefore, the user can more easily understand the contents of the selected process.

When an input operation to two-sided copy setting keys **7100** to **7106** is received, corresponding icons **7200** to **7206** may be displayed in a prescribed less visually noticeable manner. Therefore, the present invention is not limited to the above-described embodiment in which the display color of icons **7200** to **7206** is darkened. By way of example, icons **7200** to **7206** may be erased. Alternatively, display density of icons **7200** to **7206** may be lowered.

Further, according to the embodiment above, on copy mode basic screen image **6000**, a binding direction setting key (not shown) for adding a prescribed process (binding direction) to the selected process is displayed. On two-sided copy setting screen image **7000**, check box **7400** for adding a

prescribed process (180° rotated copy process) to the selected process is displayed. CPU **300** reflects the contents of added process to the animation images. Thus, the user can easily understand the contents of added process. This further improves user convenience.

Further, according to the embodiment above, movie display area **7500** is provided closer to the still image display area. Therefore, it becomes easier for the user to recognize the image representing the contents of the selected process.

Further, according to the embodiment above, image forming apparatus **100** is an image forming apparatus executing a plurality of processes including image processing on image data, including operation unit **120** as described above, image forming unit **104** executing the process selected by operation unit **120**, FAX communication unit **160** and network I/F **304**. Since image forming apparatus **100** includes operation unit **120**, erroneous selection of a process (for example, erroneous copy) different from the process desired by the user can be prevented, and it is possible for the user to easily cause image forming apparatus **100** to execute the desired process.

<Modification>

In the embodiment above, if the tentatively determined set contents at step **S1005** are one-sided/one-sided copy or two-sided/two-sided copy, nothing is displayed on movie display area **7500** and the corresponding icons **7200** and **7204** are displayed in a dark color. The present invention, however, is not limited to such an embodiment. By way of example, nothing may be displayed in movie display area **7500**, and icons **7200** and **7204** may be displayed in the original manner of display (in a bright color).

Further, in the embodiment above, the animation images are displayed only once as a movie in a prescribed order. The present invention, however, is not limited to such an embodiment. The movie display may be repeated a prescribed number of times and then stopped.

Further, in the embodiment above, the images representing the contents of one-sided/two-sided copy process and two-sided/one-sided copy process are displayed as movies, to show the details of the corresponding process contents. The present invention, however, is not limited to such an embodiment. By way of example, difference in process contents may be indicated by changing the display color, and thereby the contents of corresponding process may be displayed in detail.

Further, in the embodiment above, no matter which of two-sided copy setting keys **7100** to **7106** is pressed, the animation images are displayed at substantially the same position. The present invention, however, is not limited to such an embodiment. The animation images may be displayed at any position easily recognizable by the user.

The embodiments as have been described here are mere examples and should not be interpreted as restrictive. The scope of the present invention is determined by each of the claims with appropriate consideration of the written description of the embodiments and embraces modifications within the meaning of, and equivalent to, the languages in the claims.

What is claimed is:

1. An operation console provided on an apparatus that executes a plurality of processes, comprising:

a display configured to display a display screen image including a first area on which a plurality of virtual keys corresponding to respective ones of said plurality of processes used to select any of said plurality of processes are displayed;

a receiver configured to receive an input operation to said virtual keys; and

a first display processor configured or programmed to be responsive to said receiver receiving said input operation, to display, on a second area different from said first area of said display screen image, an image representing contents of the selected process in a prescribed state; wherein

said virtual key includes first character information representing a state of an object of processing before execution of the process selected by said virtual key, and second character information representing a result of execution of the process selected by said virtual key.

2. The operation console according to claim **1**, wherein said icon indicating contents of a process corresponding to said virtual key includes an icon corresponding to said first character information and an icon corresponding to said second character information.

3. The operation console according to claim **1**, further comprising a second display processor configured or programmed to display, next to one of said virtual keys in said first area, an icon indicating contents of processes corresponding to the one of said virtual keys; and

said second display processor is configured or programmed to, responsive to said receiver receiving said input operation, display said icon in a prescribed less visibly recognizable manner.

4. The operation console according to claim **1**, further comprising:

an adder configured to add a prescribed process to said selected process; and

a reflector configured to reflect contents of said added process to the image representing the contents of said selected process.

5. The operation console according to claim **1**, wherein said plurality of processes include at least a one-sided/two-sided copy process to form a two-sided copy from a one-sided document and a two-sided/one-sided copy process to form a one-sided copy from a two-sided document; and

said first display processor is configured or programmed to display, in response to said receiver receiving an input operation to the virtual key corresponding to said one-sided/two-sided copy process, images representing a state of images printed on two sides of a sheet of recording paper, as image representing contents of said selected process, in a prescribed state, on said second area.

6. The operation console according to claim **1**, wherein said plurality of processes include at least a one-sided/two-sided copy process to form a two-sided copy from a one-sided document and a two-sided/one-sided copy process to form a one-sided copy from a two-sided document; and

said first display processor is configured or programmed to display, in response to said receiver receiving an input operation to the virtual key corresponding to said two-sided/one-sided copy process, images representing a state of two images of one two-sided document respectively printed on one side of two sheets of recording paper, as images representing contents of said selected process, in a prescribed state, on said second area.

7. An image forming apparatus executing a plurality of processes including image processing of image data, comprising:

the operation console according to claim **1**; and

the processor configured or programmed to execute a process selected by said operation console.

8. An operation console provided on an apparatus that executes a plurality of processes, comprising:

a display configured to display a display screen image including a first area on which a plurality of virtual keys corresponding to respective ones of said plurality of processes used to select any of said plurality of processes are displayed;

a receiver configured to receive an input operation to said virtual keys; and

a first display processor configured or programmed to be responsive to said receiver receiving said input operation, to display, on a second area different from said first area of said display screen image, an image representing contents of the selected process in a prescribed state; wherein

said first area includes, for each said virtual key, an icon indicating contents of a process corresponding to said virtual key;

said first display processor, responsive to said receiver receiving said input operations, displays said image representing contents of the selected process larger than said icon corresponding to said virtual key; and

said image representing contents of the selected process is displayed closest to the one of said plurality of virtual keys which is operated through said input operation.

9. A method of controlling an operation console provided on an apparatus that executes a plurality of processes, comprising the steps of:

displaying a display screen image including a first area in which a plurality of virtual keys corresponding to respective ones of the plurality of processes for selecting any of said plurality of processes are displayed;

receiving an input operation to said virtual keys; and

using a processor to display, in response to the processor receiving said input operation, on a second area different from said first area of said display screen image, an image representing contents of the selected process in a prescribed state; wherein

said virtual key includes first character information representing a state of an object of processing before execution of the process selected by said virtual key, and second character information representing a result of execution of the process selected by said virtual key.

10. The control method according to claim **9**, wherein said icon indicating contents of a process corresponding to said virtual key includes an icon corresponding to said first character information and an icon corresponding to said second character information.

11. The control method according to claim **9**, further comprising the step of displaying, next to one of said virtual keys in said first area, an icon indicating contents of processes corresponding to the one of said virtual keys; wherein said step of displaying said icon includes the step of displaying said icon in a prescribed less visibly recognizable manner, in response to receiving said input operation.

12. The control method according to claim **9**, further comprising the steps of:

adding prescribed process to said selected process; and

reflecting contents of said added process to the image representing the contents of said selected process.

13. The control method according to claim **9**, wherein said plurality of processes includes at least a one-sided/two-sided copy process for forming a two-sided copy from a one-sided document, and a two-sided/one-sided copy process for forming a one-sided copy from a two-sided document; and

at said step of displaying the image representing contents of said selected process in a prescribed state, images representing a state of images printed on two sides of a sheet of recording paper are displayed as images representing contents of said selected process, in a prescribed state, on said second area, in response to reception of an input operation to the virtual key corresponding to said one-sided/two-sided copy process.

14. The control method according to claim **9**, wherein said plurality of processes includes at least a one-sided/two-sided copy process for forming a two-sided copy from a one-sided document, and a two-sided/one-sided copy process for forming a one-sided copy from a two-sided document; and

at said step of displaying the image representing contents of said selected process in a prescribed state, images representing a state of two images of one two-sided document respectively printed on one side of two sheets of recording paper are displayed as images representing contents of said selected process, in a prescribed state, on said second area, in response to reception of an input operation to the virtual key corresponding to said two-sided/one-sided copy process.

15. A method of controlling an operation console provided on an apparatus that executes a plurality of processes, comprising the steps of:

displaying a display screen image including a first area in which a plurality of virtual keys corresponding to respective ones of the plurality of processes for selecting any of said plurality of processes are displayed;

receiving an input operation to said virtual keys;

using a processor to display, in response to the processor receiving said input operation, on a second area different from said first area of said display screen image, an image representing contents of the selected process in a prescribed state; and

displaying for each said virtual key, an icon indicating contents of a process

corresponding to said virtual key, in said first area; wherein

in response to reception of said input operation, said image representing contents of the selected process is displayed larger than said icon corresponding to said virtual key; and

said image representing contents of the selected process is displayed closest to the one of said plurality of virtual keys which is operated through said input operation.

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